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OUR COVER: California is bounded on the north and east by mountains, on the south by desert, and on the west by the Pacific Ocean, thus making the entry of agricultural pests by natural means nearly impossible. Agricultural pest entry by other means is checked at points of entry. For an explanation of quarantine stations see page 256.

The *Quarterly Bulletin*, published as a contribution to the welfare of California Agriculture, is mailed free to California citizens interested in the work of the Department of Agriculture. The *Bulletin* is exchanged, on request, for publications of the Federal Government, Experiment Stations, and other state or national agricultural offices or organizations.
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Protection of California Agriculture Through Plant Quarantines

By E. A. BREECH, Assistant Chief
Bureau of Plant Quarantine

California, America's top ranking state in the value and diversity of farm products, is also the pioneer and leading state in the development and maintenance of plant quarantines as a protection to the State's vast agricultural industry.

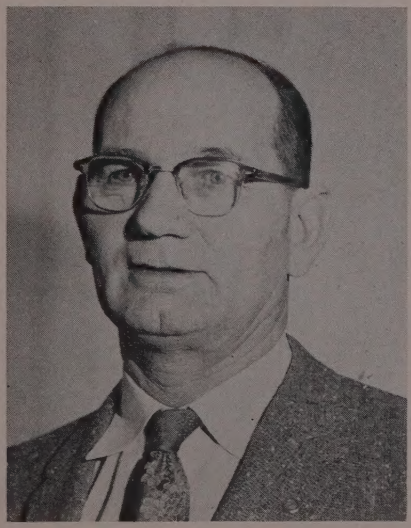
As public health quarantines protect against human diseases and pests, plant quarantines protect against the introduction and establishment of crop pests not presently found within our boundaries, and serve to prevent the spread of pests of economic importance which have been found in limited areas in the State.

This vital agricultural protective service, in which the State of California now invests about $1,000,000 annually, began with the enactment in 1881 of California's first State Plant Quarantine Law, aimed at control of a serious disease of grapevines.

A series of events in the decade following 1870 directed world-wide attention to the heavy financial losses resulting from the introduction and spread of insect pests. A minute organism known as grape phylloxera, *Phylloxera vestatrix,* attacked cultivated grapevines, and greatly reduced the yield of vineyards in California, and also in such widely separated regions as Australia, France, Spain, Portugal, Russia, and probably all other wine-producing states of Europe.

The importance of the wine industry soon caused scientific bodies and horticultural societies in both hemispheres to become diligent in their efforts to find a way of controlling this pest. Widespread discussion on the results of these studies, and the concentration on principles of farm sanitation, rallied public opinion in support of legislation to prevent pest introduction and to protect

A. P. Messenger, Chief, Bureau of Plant Quarantine



E. A. Breech, Assistant Chief, Bureau of Plant Quarantine

against pest damage, thus laying the foundation for the system of plant quarantine regulations that prevail throughout the world today.

During the period 1880 to 1890, horticultural legislation became prominent in the history of California, not only in the scope of the measures enacted, but also in the providing of ways and means for enforcement of plant quarantine laws and regulations.

Pioneer Growers Had Vision

Those then responsible for development of the original concept of plant quarantine regulations were the real pioneers and founders of our present agricultural empire. Those who were planting and expanding the state's first fruit crops realized clearly the need for protection against the ravages of the grape phylloxera in the wine vineyards, but their vision of the future did not stop there. Later on the San Jose scale and cottony cushiony scale in the fruit tree plantings of the State aroused the anxiety of the early growers who advocated the use of police powers of the State in the form of quarantines to exclude dangerous plant pests. They theorized wisely that it would be more economical to prevent or delay the introduction or spread of pests than to submit to annual crop losses, and to the expense of control or eradication measures over an indefinite period.

The 1880 Session of the State Legislature provided authority for the Governor to appoint a Board of State Viticultural Commissioners, to consist of nine members, two to be appointed from the State at large, and one to be appointed from each of the seven viticultural districts.

The creation of this new board was the first legal step taken to promote and protect the State's viticultural industry, and to provide for research and specialized education in viticulture at the state university. As a compromise to the horicultural industry, which had been striving for a separate State Board of Horticulture, the Legislature, as of March 4, 1881, authorized the Viticultural Board to appoint a Chief Executive Horticultural Officer. An Advisory Board of Horticulture was selected to nominate such new officer. He assumed office April 6, 1881.

In the meantime, and effective March 14, 1881, the Legislature authorized the creation of county boards of horticultural commissioners selected by the county boards of supervisors upon petition of five or more producers. There was almost immediate response in a number of California counties. Between April 8, 1881, and June 30, of that year, the following counties had county boards of horticultural commissioners, starting with Sacramento April 8, 1881, and in the following sequence: Yolo, Santa Barbara, El Dorado, Solano, Contra Costa, Santa Cruz, Santa Clara, and San Joaquin. These actions substantiate the fact that pest suppression became available officially in the counties prior to the establishment by law of a co-ordinating state agency. A statutory State Board of Horticulture actually did not come into existence until 1883.

During the latter part of 1881, quarantine rules were promulgated by the State Viticultural Board to protect grape plantings and fruit trees from insect pests.

Quarantine Provisions

The quarantine action taken at that time provided for the disinfection of all cuttings, grafts, scions, plants or trees infested with any insect known to be injurious to fruit or fruit trees, before distribution or transportation of the material from the place where grown.

All cuttings, grafts, scions, plants, or trees, imported or brought into the State were required to be disinfected immediately after their arrival, unless a clean bill of health was certified to by the examining officer, in which case disinfection would be unnecessary.

Fruit, infested by any scale insect known to be injurious to fruit and fruit trees, was required to be disinfected before removal from the premises where grown.

Fruit, infested by any insect known to be injurious to fruit and fruit trees, imported or brought into the State, was prohibited from being offered for sale, gift, distribution or transportation.

Fruit, infested by codling moth, or its larvae or pupae, was prohibited from being kept in any orchard, storeroom, salesroom, or place, or from being dried or removed for sale, gift, distribution or transportation.

Fruit containers used for shipping fruit were required to be disinfected prior to being returned to any orchard, storeroom, salesroom, or place to be used for storage, shipping, or any other purpose.

Transportable material of any kind, infested by any insect known to be injurious to fruit or fruit trees, was prohibited from being offered for sale, gift, distribution, or transportation.

Cuttings, grafts, scions, plants, or trees could be disinfected by dipping in a solution composed of not less than one pound of commercial concentrated lye to each two gallons of water, or in any other manner satisfactory to the Chief Executive Horticultural and Health Officer.

Empty fruit boxes, packages, or baskets could be disinfected by dipping in boiling water containing, in solution, not less than one pound of concentrated potash, or three-fourths of one pound of concentrated lye, to each 20 gallons of water, and allowing them to remain in the boiling water not less than two minutes, or in any other manner satisfactory to the Chief Executive Horticultural and Health Officer.

Use of Whale Oil Soap

Fruit on deciduous and citrus trees infested by any species of scale insect could be disinfected before removal from the tree, or from the premises where grown, by washing or thoroughly spraying with a solution composed of one pound of whale oil soap and one-fourth of one pound of sulphur to each one and one-quarter gallons of water, or in any other manner satisfactory to the Chief Executive Horticultural and Health Officer.

Owners of fruit grown on premises where plants were infested with insects known to be injurious to fruit and fruit trees, were required to procure a certificate of disinfection before removal for sale, gift, distribution or transportation.

Any cuttings, grafts, scions, plants, or trees, empty fruit containers, or transferable material of any kind, offered for sale, gift, distribution or transportation, in violation of the quarantine rules and regulations, could be seized by the Chief Executive Horticultural and Health Officer, or by any of the local resident inspectors appointed by him, and held for disinfection, or for an order of condemnation by a court of competent jurisdiction.

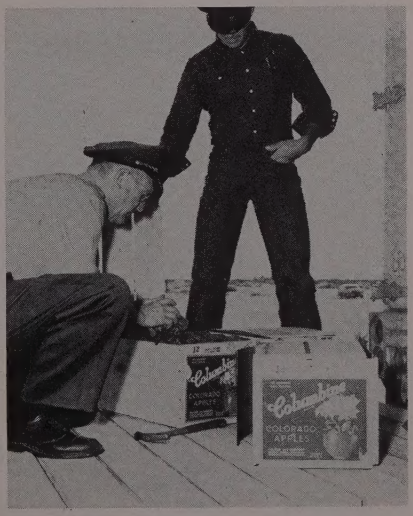
Any person violating the quarantine rules and regulations was deemed guilty of a misdemeanor, and upon conviction was punishable by a fine of not less than $25 or more than $100.

In January, 1883, the State Supreme Court declared the quarantine rules and regulations which had been adopted in 1881 to be unconstitutional because they represented an illegal delegation of legislative power. This action served to alert the State Board of Horticultural Commissioners as to its lack of authority. Its existence as a board was the result of an act of courtesy, not of law. As created by the Board of Viticultural Commissioners, without any legal sanction for such action, there was no authority vested in the board whereby rules and regulations might be promulgated and enforced. With this rude awakening, the board, supported by interested industry leaders, set about to develop proper legal status.

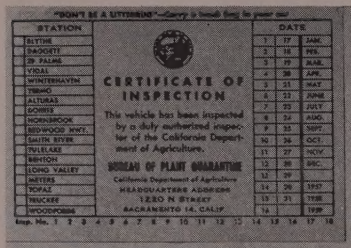
State Board Created

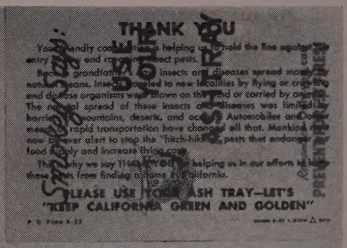
On March 13, 1883, the State Legislature approved an act to create and establish a State Board of Horticulture, which provided the horticultural industry with a legally appointed body authorized to promote and protect the State's agricultural industry. Sixteen years later California's first basic act relating to interstate plant quarantines became law. Further legislative changes were made during the ensuing years, among them enactment of California's first Fruit Standardization Act in 1913, and creation of the State Department of Agriculture in 1919.

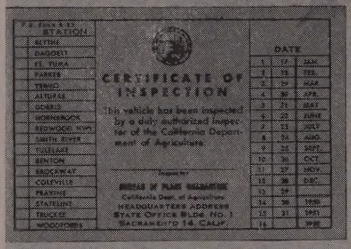
On March 10, 1885, the Legislature approved a very comprehensive act to prevent the spread of fruit tree pests and diseases, and to provide for their extirpation. The county commissioners of horticulture had continued to carry on the work delegated

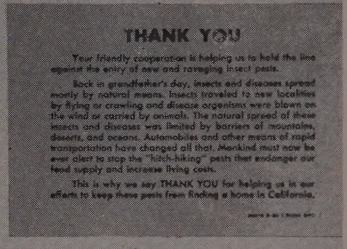


Quarantine inspector checking an out-of-state shipment of apples destined for California's markets.




THANK YOU
Your friendly cooperation is helping us to hold the line against the entry of new and ravaging insect pests.
Back in grandfather's day, insects and diseases spread mostly by natural means. Insects traveled to new localities by flying or crawling and disease organisms were blown on the wind or carried by animals. The natural spread of these insects and diseases was limited by barriers of mountains, deserts, and oceans. Automobiles and other means of rapid transportation have changed all that. Mankind must now be ever alert to stop the "hitch-hiking" pests that endanger our food supply and increase living costs.
This is why we say THANK YOU for helping us in our efforts to keep these pests from finding a home in California.
PLEASE USE YOUR ASH TRAY—LET'S "KEEP CALIFORNIA GREEN AND GOLDEN"
SAMPLE
DO NOT REMOVE

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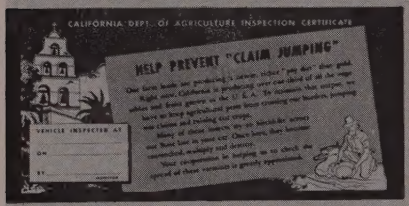
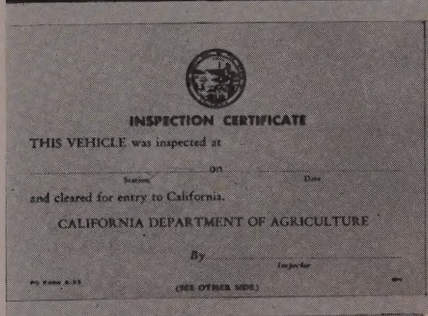
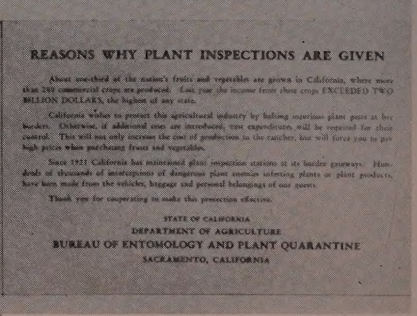
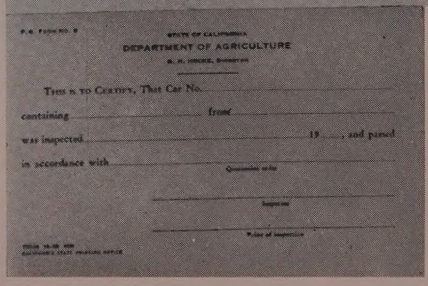





REASONS WHY PLANT INSPECTIONS ARE GIVEN
About one-third of the nation's fruits and vegetables are grown in California, where more than 200 commercial crops are produced. Last year the income from these crops EXCEEDED TWO BILLION DOLLARS, the highest of any state.
California wishes to protect this agricultural industry by halting injurious plant pests at her borders. Otherwise, if additional ones are introduced, new expenditures will be required for their control. This will not only increase the cost of production to the rancher, but will force you to pay high prices when purchasing fruits and vegetables.
Since 1921 California has maintained plant inspection stations at its border gateways. Hundreds of thousands of interceptions of dangerous plant enemies infesting plants or plant products, have been made from the vehicles, baggage and personal belongings of our guests.
Thank you for cooperating to make this protection effective.
STATE OF CALIFORNIA
DEPARTMENT OF AGRICULTURE
BUREAU OF ENTOMOLOGY AND PLANT QUARANTINE
SACRAMENTO, CALIFORNIA



The evolution of the Quarantine Inspection Certificate in California. Lower left, illustrates the first type of certificate used. This required considerable writing in order to complete the form. As traffic across California's borders increased, the time consumed in filling out inspection certificates increased proportionately. In order to save time, subsequent certificates required less writing. The certificate used today is shown in the upper left column. Note the modern certificate requires no writing at all. The inspector uses a punch to mark the station, date and his identification.

to them in varied degrees of efficiency, depending on the demands of industry in their respective areas.

With the passage of the 1885 legislative measures, there arose the question as to whether the state quarantine guardians or the county commissioners of horticulture were the proper officers to enforce the law. Eventually a compromise was adopted and a service carrying dual authority created. Boards of Supervisors in counties where there was a demand for such action appointed county commissioners of horticulture who, in turn, appointed local inspectors from the number of quarantine guardians who were already appointed under the law relating to the extirpation of fruit pests.

Los Angeles County took the lead in this procedure by appointing a county board of horticultural commissioners in July, 1885. Ventura, San Diego, and Kern Counties followed quickly with similar action.

At the instigation of the State Board of Horticulture, the horticulture statutes of California were further amended by the 1889 session of the Legislature. This amendment provided for collection and dissemination of information relative to horticulture. The Office of Inspector of Fruit Pests was abolished, and that of Clerk of the Publishing and Quarantine Buerau created. It provided a sound legal authority for establishing county boards of horticultural commissioners and outlined their responsibilities. Provisions were made for the State Board of Horticulture to issue commissions as quarantine guardians to county commissioners and inspectors for the purpose of developing uniformity of action throughout the State.

Illustrating the foresight of those responsible for these early laws, provisions remain in the Agricultural Code specifying that each commissioner is an enforcing officer of all laws, rules, and regulations relative to the prevention of the introduction into or spread within the State, of pests, and in the performance of such duties, is under the supervision of the Director of Agriculture. This same section of the code provides that all county agricultural commisisoners, deputy commissioners and inspectors are state plant quarantine officers.

County Government Act

The county government act of 1889, further defining the powers of supervisors, had a great influence in the control of insect pests by local or county authorities. This act of 1889 also provided authority for the supervisors to make and enforce regulations covering the destruction of gophers, squirrels, and other wild animals, noxious weeds, and insects injurious to fruit or fruit trees, or vine or vegetables, or plant life in their counties.

With the finding of the melon fly and Mediterranean fruit fly in Hawaii at the turn of the century, it was felt that strong state quarantine action should be taken to exclude these pests, which could do such great damage to a long list of California fruits and vegetables. The California Plant Quarantine Law was passed in January, 1912.

To cope with threatening pest introduction from foreign countries, a national law was enacted in August of 1912. This federal legislation permitted the establishment of regulations pertaining to the prohibition of foreign agricultural material unless such host material could be treated properly to kill pests, or was certified as having been grown in pest-free areas.

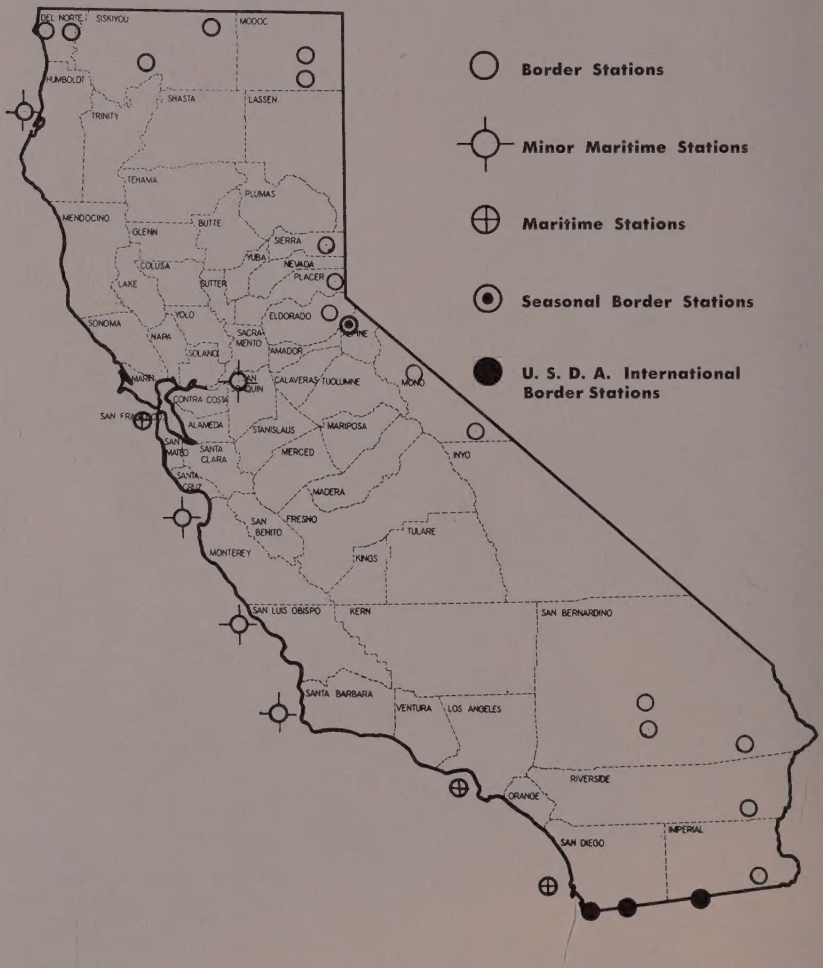
In later years, the ideas developed by these early pioneers were expanded and applied more frequently to protect pest-free areas of the State from pests occurring in other parts of the State.

History proves that the theory developed by these early growers was sound. It is established and settled in California that plant quarantines are an integral part of organized pest control through delaying or preventing the introduction or spread of serious pests, while other agencies carry on research in the development and application of effective control or eradication measures.

California Maintains Strict Inspection

Heeding the lessons of history and being constantly aware of the disastrous losses caused by plant pests in other states and countries, California maintains a strict plant quarantine inspection system as its first line of defense against the introduction, establishment, and spread in this State of harmful insect pests, diseases, weeds, or animals not now present which would be detrimental to our $2,800,000,000 agricultural industry. Maintenance of the plant quarantine inspection system is in accordance with the duties and responsibilities charged to the California Department of Agriculture in the Agricultural Code.

QUARANTINE STATIONS PROTECTING CALIFORNIA'S AGRICULTURE



To provide this protection on all fronts, 22 exterior quarantines, directed against specific pests in other states, and 17 interior quarantines, directed against pests occurring in limited areas of this State, have been adopted by the department.

In addition to the state quarantines, there are 19 federal domestic and 17 federal foreign quarantines which the U. S. Department of Agriculture has promulgated to prevent the spread of certain pests which are of economic concern to the entire United States.

The Agricultural Code provides that the department shall enforce federal quarantines in California. The Bureau of Plant Quarantine is responsible for the enforcement of

these quarantines in addition to the basic law which provides that all plants and plant material are subject to inspection for pests as a condition of entry to the State.

For administrative purposes, the work of the Bureau of Plant Quarantine has four divisions:

(1) Administration. To keep the various quarantines current, develop new quarantine action as required, and direct the overall quarantine program.

(2) Interior inspection. Enforcement of quarantines in the interior of the State, performed by county agricultural commissioners under the direction of the bureau. This work includes inspection at interior points of interstate and intrastate shipments through the mail, express, rail freight, or truck.

(3) Maritime inspection. Concerned with the inspection of ships and airplanes, performed in co-operation with the U. S. Department of Agriculture.

(4) Border highway inspection. Concerned with inspection of vehicles.

While the interior inspection, maritime inspection, and border inspection services are separate functions of the bureau, each is an important part of the State's overall agricultural protection program. Plant quarantine service is an integral part of organized pest control, teaming with research and control agencies in the suppression and control of injurious pests. These agencies complement, but do not modify each other.

Four Primary Facts

There are four primary facts which make plant quarantines more important to California agriculture than to most other states.

The first of these is the importance of the State's agricultural production to the Nation. California growers and processors supply about one-third of the Nation's fresh fruits and vegetables, most of the Nation's supply of dried fruit and nuts, and a large share of America's dried beans, sugar beets, cotton, flax and potatoes. Most fruits and vegetables are high-investment crops, as compared to field crops, and therefore must yield a high per-acre return to enable growers to continue production from year to year. Obviously, in such a financial venture, a severe insect or disease pest outbreak would cause an immediate and tremendous loss to growers of such crops.

The second major consideration is the wide climatic and crop range in California. Climatic conditions range from high plateau to subtropical, and from humid to arid.

The crop range corresponds to the climate range. California has more than 250 commercial crops, the largest total of any state. This range of climate and crops provides practically any type of climate and feeding conditions that almost any insect or disease may require in order to exist.

The third major consideration of importance is the natural geographic isolation which prevails in California, not common to other regions of the United States. The natural migration of insects and plant diseases, unretarded or unimpeded in most parts of our country, meets severe obstacles in the Sierra Nevada Mountain range, the extensive desert regions of the eastern and southern border sections of the State, the Pacific Ocean on the west, and the Siskiyou and Warner Mountains on the north and east.

The fourth major consideration is that farming methods in California permit the rapid spread of pests. Farming is more generally on the specialty crop basis than on the diversified basis. Large areas are devoted to the planting of one crop in contiguous areas, such as the early long white potato regions in Kern County; the canning cling peach districts in Sutter, Yuba, Stanislaus, and Merced Counties; the citrus plantings in Southern California and the Central Valleys, and the lettuce plantings in the Salinas and Imperial Valleys.

A pest of any of these crops, once established, could, unless controlled, spread rapidly through the contiguous plantings.

Since their establishment, plant quarantines have been directed, for the most part, against pests attacking growing crops. Previously, quarantines had been directed against infested or infected states, counties, or areas. This was the case until 1953, when the grain-processing and storage industry suffered a massive attack by the Khapra beetle, *Trogoderma granarium*, a notorious pest of stored malt barley in England, and of stored grain in India. Surveys showed it was also present in Arizona and New Mexico. This nonflying, nonmigrating beetle of Asiatic subcontinental origin, built up a heavy population in warehouses and mills, destroying or threatening to destroy huge quantities of stored grain.

First Storage Pest Quarantine

Faced with the threat of heavy losses in grain, the bureau undertook for the first time to apply plant quarantine policies against a storage pest. This was done in co-

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California quarantine stations showing different styles of architecture. (1) Tulelake, Modoc County, State Sign Route 139; (2) Winterhaven, Imperial County, U. S. 80; (3) Redwood Highway, Del Norte County, U. S. 199; (4) Blythe, Riverside County, U. S. 60 and 70; (5) Smith River, Del Norte County, U. S. 101; (6) Dorris, Siskiyou County, U. S. 97; (7) Dagget, San Bernardino County, U. S. 66.

operation with the Bureau of Entomology, United States Department of Agriculture, and county agricultural commissioners in an attempt at eradication of the pest. A quarantine was placed against infested premises.

Application of quarantine action to a storage pest was a new experience for operators of grain warehouses, feed mills, and retail stores within the State. However, they realized the gravity of the situation and in almost every instance co-operated wholeheartedly in the costly and co-ordinated effort to eliminate the pest.

County agricultural commissioners and their inspectors have carried the major share of the burden in the enforcement of this regulation. This quarantine remains a vital instrument in support of the present federal and state Khapra beetle suppression program. Owners of infested properties contributed materially to the success of the program by complying with quarantine regulations and other requirements.

Through the effective co-operation of the county agricultural commissioners, the Bureau of Entomology of the California Department of Agriculture and representatives of the U. S. Department of Agriculture, the Bureau of Plant Quarantine obtained successful enforcement of the Khapra beetle quarantine regulation without forcing undue economic hardship on owners of infested properties.

The enforcement of other interior quarantines has aided in the control and eradication of these pests against which they were directed.

The Mexican bean beetle, for example, for many years was under quarantine in Ventura County until it was eradicated by the joint effort of the Ventura County Agricultural Commissioner and the department's Bureau of Entomology.

Spread of chestnut bark disease is being retarded by an interior quarantine until it can be eradicated through efforts of the Bureau of Plant Pathology of the California Department of Agriculture and the San Joaquin County Agricultural Commissioner's office.

State Free of Major Cotton Pests

The enforcement of plant quarantines has apparently been successful in preventing the introduction and establishment of such important pests as the cotton boll weevil and pink bollworm, two of the most serious pests of cotton, one or both of which occurs in all cotton-growing states of the United States, with the exception of California; citrus canker, Mediterranean fruit fly, Oriental fruit fly, and several other major pests of citrus; sweet potato weevil, which takes a heavy toll of the sweet potato production in most of the southern states; peach yellows, peach rosette, and little peach, virus diseases which are costly to the peach industry in most of the eastern part of the United States; European corn borer, cornstalk borer, and sugarcane borer, costly pests of corn, sugarcane, and sorghums in many other states; Colorado potato beetle, which occurs in most of the commercial potato growing districts of the United States except Nevada and California; plum curculio, apple and blueberry maggot, major pests of deciduous fruits in the United States east of the Rockies; Japanese beetle, which attacks most farm, garden and orchard products in the eastern part of the United States, and many other pests which would prove to be detrimental should they become established in this State.

For many years California plant quarantine regulations were of the prohibitive type. Prohibition of the entrance to the State of hosts of the quarantined pest provided satisfactory protection. However, as the facilities for the interstate movement of produce and agricultural material of all kinds changed and demand for the prohibited material increased, it became clear that other measures would be necessary to provide California agriculture adequate safeguard against pest introduction and yet permit safe movement of the quarantined commodities.

A definite trend away from the prohibitive type quarantines in favor of restrictive measures was apparent. During the past 20 years almost all of the State's quarantines have been revised and redirected to permit movement of quarantined items when properly treated and certified by responsible officials. With few exceptions, where there is no known treatment to control the pest being guarded against, all of the quarantines of this period have been of the restrictive type, permitting movement of the quarantined items when accompanied by official certification of treatment or evidencing origin of the items in an area which is known to be free of the pest.

In 1943, the Agricultural Code was amended to provide for the intercounty certification of nursery stock in the interest of developing better cleanup of pests in nurseries, to bring about more uniform inspec-

tion and to eliminate duplicating inspections. Under this program, nurseries meeting the established standard of cleanliness are authorized to use the "Pinto Tag" certificates, which eliminate the need for holding material at destination for inspection.

Steady Increase in Travel

Records of the bureau show that the degree of danger of pest introduction is related to traffic trends, increasing or decreasing in direct ratio to the increase or decrease in the number of persons entering the State. With the exception of war years, there has been a steady increase in the number of persons entering the State in all types of transportation since the beginning of plant quarantine enforcement.

Many factors have contributed to the increase in travel. Tremendous improvements have been made in highways, and the planned construction of the interstate freeways into and within the State will further encourage travel.

New, larger, and faster trucks have increased the movement of produce and other freight.

The rapid growth of air transportation continues to increase the danger of foreign plant pests being introduced by this manner into the United States and California. In addition to international air travel, commerce in plants and plant products by air is developing steadily.

The speed with which pests may now be brought from all parts of the world makes conditions more favorable for their survival, and necessitates constant vigilance to apprehend them at ports of entry.

Quarantine inspectors in action showing the interior of a border inspection station.

Table 1 shows highway vehicles, ships, and airplanes entering the State through California state plant quarantine inspection stations during the past 10 years.

Aircraft tabulated includes only those arriving from foreign countries.

TABLE 1

Year	Vehicles inspected at border stations	Ships inspected at maritime stations	Airplanes inspected from foreign countries
1957	4,476,857	9,209	3,762
1956	4,429,231	9,069	3,218
1955	4,119,720	8,845	2,593
1954	3,835,242	9,404	2,817
1953	3,758,321	11,298	2,553
1952	3,374,920	11,228	2,316
1951	3,046,386	10,994	2,167
1950	2,629,548	11,533	2,117
1949	2,242,131	11,840	2,055
1948	2,267,364	10,230	1,888

During the period of May 11, 1956, to June 1, 1957, 6,367 domestic aircraft were inspected as a precaution against the introduction of the Mediterranean fruit fly present at that time in Florida. These airplanes were on direct or connecting flights from Florida.

CALIFORNIA PLANT QUARANTINE INTERCEPTIONS

1948-1957

Year	Total lots plant material intercepted	Total lots of pests taken
1957	114,250	45,506
1956	113,927	40,394
1955	110,889	45,590
1954	110,157	47,001
1953	105,632	40,114
1952	104,528	36,460
1951	100,216	28,891
1950	89,143	40,331
1949	89,496	37,811
1948	78,037	34,029
Totals	1,016,275	396,127

Among the important pests taken in this period were Oriental fruit fly, melon fly, Mediterranean fruit fly, citrus black fly, Japanese beetle, European corn borer, cotton boll weevil, pink bollworm, citrus canker, sweet potato weevil, plum curculio, apple maggot, Colorado potato beetle, golden nematode, and burrowing nematode.

The conclusion of World War II and the lifting of gasoline and tire rationing released a tremendous migration of people to California.

The flood of postwar traffic caused inconvenience and delays to travelers entering California through the border plant quarantine inspection stations on main highways. Sufficient trained employees were not available to handle properly the swelling tide of traffic, and travelers made many complaints.

Major Changes Made

Faced with this situation, the quarantine inspection program at all stations was analyzed and several major changes were made. Prior to this study, policy required thorough plant quarantine inspection, insofar as possible, of each vehicle entering the State.

The postwar study indicated that thorough inspections should be stressed during those certain seasons of the year when restricted commodities were available. At other times and seasons when restricted material was not available, the degree of inspection could be modified.

A review of data on interceptions revealed that there were certain containers and places in vehicles where restricted material was seldom or never found.

A revision was made of the border inspection policy requiring that inspection of each vehicle entering a border station be made to the degree only of the pest introduction hazard represented by the particular vehicle. The inspection was required to be thorough if the vehicle had come from, or had passed through, areas where material restricted admittance by California plant quarantines was readily available.

If the vehicle had traversed only those areas where quarantined plant material was not available, then the inspection was to be modified accordingly.

An inservice training program was developed, and all border station employees were required to complete it. This course stressed streamlined inspection procedure and good public relations. The training program resulted in considerable improvement in the morale of employees, and was credited with reducing the number of complaints made by travelers.

The permanent inservice training program, revised as conditions warrant, has enabled border station inspection personnel to increase by 100 percent the number of vehicles inspected during the past 10 years with practically no increase in personnel.

During this decade complaints against border inspectors averaged less than 20 annually. About the same number of compliments are now received.

Interception records show that the ratio of interceptions to the number of vehicles inspected has remained comparable to inter-

ceptions made during the period when 100 percent inspection was required.

Each complaint is investigated thoroughly and promptly, and corrective action taken when appropriate.

Complaints fall into the following general categories: (1) lack of understanding of plant quarantine restrictions, although explanation is given at the time of inspection; (2) resentment at delay and inconvenience; (3) the charge that quarantine inspection is only a trade barrier for the benefit of California growers; (4) the claim that inspectors should be able to judge people, and, (reading the crystal ball) should recognize those who would carry restricted material; (5) the claim that the inspector was discourteous and officious, and did not explain clearly the need for inspection.

For administration, the border stations are divided into three districts with a supervisor in charge of each district.

The southern district includes stations at Winterhaven, in Imperial County; Blythe in Riverside County; Vidal, Daggett, Twenty-nine Palms, and Yermo in San Bernardino County.

The Nevada district includes stations at Benton and Topaz in Mono County; Woodfords in Alpine County; Meyers in El Dorado County; Truckee in Nevada County; and Long Valley in Sierra County.

The northern district stations include stations at Alturas and Tulelake in Modoc County; Dorris and Hornbrook in Siskiyou County; and Redwood Highway and Smith River in Del Norte County.

All of these stations, except Woodfords, are permanent. Woodfords is shut down when snow closes that highway.

Co-operative Work at Ports

The major port stations are at San Francisco, San Pedro, and San Diego. Much of the work at these stations consists of the co-operative enforcement of federal foreign quarantines. The enforcement of federal foreign quarantines is the responsibility of the U. S. Department of Agriculture, Plant Quarantine Division. However, this part of the work in California is handled by Bureau of Plant Quarantine employees serving as collaborators of the Federal Plant Quarantine Division.

The maritime inspection work at the eight minor port stations at Eureka, Humboldt County; Monterey, Monterey County; San Luis Obispo, San Luis Obispo County; Santa Barbara, Santa Barbara County; Stockton, San Joaquin County; Ventura and Hueneme in Ventura County; and Crescent City, Del Norte County, is performed by county agricultural commissioners who are federal collaborators for the purpose of enforcing federal foreign quarantines.

Plant quarantine inspectors are civil service employees in the Bureau of Plant Quarantine, and are employed at the entry level classification of junior plant quarantine inspector, with opportunities to compete for advancement to intermediate, senior, and supervising plant quarantine inspector.

There are approximately 175 plant quarantine inspectors assigned to border, maritime, and other quarantine stations in California.

Plant quarantine inspectors are recruited and promoted by competitive examinations administered by the California State Personnel Board. Examinations for junior plant quarantine inspector are held as the need of the service requires, and are publicized through branch offices of the California Department of Employment, and the State Personnel Board.

The minimum requirements for the entrance level positions are two years of general college work; or one year of agricultural college work; or three months of

Quarantine inspector issuing a certificate of inspection to a tourist.

experience in agricultural inspection or plant pest control work, and completion of the twelfth grade.

Plant quarantine inspectors ask travelers to declare what agricultural produce they are carrying. As a general rule, travelers conform and co-operate, but there are the exceptions, such as the out-of-state truck driver who declared nothing upon entering Southern California. Close inspection revealed a bushel of apples, a bushel of pears, and 10 pounds of peaches on the floor of the truck bunker. The driver explained that he didn't care for California fruit.

At a mountain border station, a California quarantine inspector stopped an out-of-state car, explained to the driver the purpose of the agricultural inspection, and asked for a declaration of the car's contents. The driver and passengers told him that the car carried absolutely no agricultural material. Upon being asked to open the trunk of the car, the driver reversed his original denial and produced agricultural commodities from a space behind the spare tire, from a suitcase and from a box of personal effects.

Plant quarantine inspectors at maritime ports of entry are often confronted with agricultural commodity smuggling. A member of the crew of a passenger liner was caught smuggling five Hawaiian-grown avocados. Four were concealed in a shredded paper packing box of "treated" papayas, and the fifth was similarly concealed in a box of pineapples. The treated papayas were destroyed along with the avocados because the seal on the box had been broken.

A shipment from Louisiana last summer illustrates the unusual type of cargo encountered by border inspectors. In this case, a truck loaded with 1,500 South American alligators, seven crocodiles, one boa constrictor, two speckled king snakes, two rattlesnakes, one crebo, 12 tigue lizards, and 50 bufo-marinus toads, was stopped at the California border because the driver could not produce a permit to bring his live cargo into the State.

After consultation with the local Fish and Game Officer, and because of the unique problem of unloading to make an inspection, the driver was permitted to proceed to his destination, where the consignee would apply for a permit. While this type of cargo is not an agricultural problem, it is evidence of the fact that quarantine inspectors work closely with other agencies concerned with law enforcement and quarantine.

Travelers often resort to ingenuity for concealment of contraband agricultural material. In one instance avocado seeds were placed neatly in an egg carton, and stored with nonquarantine material in a trailer. A customs inspector, helping a woman find her customs declaration, discovered an avocado in her purse.

Termites in Furniture

Not all quarantined material is brought into California intentionally. For example, a shipment of crated household goods shipped from Hawaii was discovered to be infested with a dry-wood termite not established on the mainland. The furniture was given a thorough fumigation with methyl bromide before being released.

As an inspector at one of the desert border stations was eating lunch, a young woman entered, and requested a drink of water. As she walked by him, she dropped a match folder, on which was written, "Read the note inside when we have gone." The note read, "Please—we need help. He has a gun under the seat cover and has threatened us. He has an uncontrollable temper—so stop us down the highway, and don't implicate Mother or me. He is under a year's probation for carrying a gun without a permit in California."

The California Highway Patrol intercepted the car, and arrested the driver.

Quarantine inspectors are often called upon to assist the traveling public in many ways. Inspectors at the station near Lake Tahoe were requested to deliver telegrams of welcome and congratulations from the Governor of California, and the President of the University of California to the university band, returning from the World's Fair at Brussels.

In addition to plant quarantine work, the border station inspectors are responsible for the inspection of all incoming and outgoing produce trucks to determine compliance with fruit and vegetable standardization laws. Under this requirement, 98,156 truckloads of produce were inspected at border stations in 1957.

New Stations Required

The acceptance of a new inspection station building at Winterhaven two years ago completed the long-range state plant quarantine building program. At that time, it was considered that modern facilities existed at all stations. However, because of new high-

way development, it is necessary to build an inspection station 10 miles east of Twentynine Palms on the Amboy-Twentynine Palms Highway in San Bernardino County. It is expected that the facilities will be ready for use during 1959.

With the development of the new federal interstate highway program, providing for freeway-type highways to replace several of the existing highways, it has been necessary for the department to adopt another long-range inspection station building program.

The long-range federal highway construction program calls for freeways to replace existing highways through Winterhaven, Blythe, Daggett, Yermo, Truckee, Dorris, and Hornbrook, with the probable addition of others later. Inspection stations on the new freeways, designed by the State Division of Architecture, and including all modern conveniences and features, will be constructed over the traveled portion of the incoming side. Driveways will be provided in accordance with traffic requirements.

Plans call for completion of new type stations at Truckee and Blythe during the current fiscal year. All the new stations will be designed in accordance with a uniform plan which has been developed through the co-operation of the Divisions of Highways and Architecture, California Department of Public Works and the U. S. Bureau of Public Roads.

Because of upward trends in the movement of nursery stock and other agricultural material during the past few years, the California Department of Agriculture augmented its agricultural protection service with a pest detection program. Full-time year-round surveys to detect new and incipient infestations are made by inspectors from the Bureaus of Nursery Service, Plant Pathology, Entomology, and Rodent and Weed Control and Seed Inspection.

To provide better protection against weed pests within the State, a program known as the "feed grain" regulation was put into effect on June 1, 1958. This regulation provided for holding for inspection at destination of all commercial shipments of grain not properly certified as to cleanliness at origin. Border stations inspect the incoming truck shipments of out-of-state feed grain in accordance with the requirements of this regulation. This procedure provides uniform inspection for feed grain moving into and within the State.

Pioneer agricultural leaders of this State had the foresight to provide both the State Director of Agriculture and agricultural commissioners, with legal authority to take action against appliances which either are, or may be determined to be, capable of disseminating pests within this State. Several county agricultural commissioners have utilized this law to protect their counties from pests not commonly distributed within the county. Several years ago, the director used this authority to cope with the hazard of cotton pest introduction represented by cotton-picking machines brought to California from cotton pest states. Although these machines had entered the State with proper certification, it was discovered that the treatment was not adequate to destroy all stages of the pink bollworm, *Pectinophora gossypiella*. Several live specimens of the pink bollworm were discovered in hidden parts of the machines.

All used cotton-picking machines were classed as appliances, and those machines which had been used to harvest cotton in other states before arrival in California were retreated.

Fumigation of Bags

Used bags and bagging were recently designated by the director as appliances capable of disseminating both the walnut husk fly, *Rhagoletis completa*, and Khapra beetle, *Trogoderma granarium*. Bag companies in the State are required to fumigate all used bags before they are returned to the trade. County agricultural commissioners enforce this appliance regulation as used bags arrive in one county from another.

The use of "hold orders" covering pests found to exist on individual properties pending quarantine action has proven to be an effective instrument by which the Director of Agriculture or a county agricultural commissioner may take immediate action whenever a pest not generally distributed within the State is found. Movement of host plants, fruit and soil, may be stopped to prevent the dissemination of the pest.

With the development of new herbicides and soil sterilants by agricultural chemical companies, county agricultural commissioners are using hold orders as a localized quarantine measure to aid in their weed control programs.

Although California has adapted the original quarantine philosophy to serve many useful purposes and has expanded the early

concept of its purpose to meet changing conditions, the basic foundation requirements of plant quarantine justification have been followed. This justification is essential for the continued application of plant quarantines.

Principles of Plant Quarantine

In the development of new quarantines and the revision or revocation of existing regulations, the "Principles of Plant Quarantine" of the National Plant Board are followed. It is the policy of the California Department of Agriculture to maintain California quarantine regulations on a sound biological basis economically justified.

The primary prerequisites of the "Principles of Plant Quarantine" are: (1) the pest concerned must be of such nature as to offer actual or expected threat to substantial interests; (2) the proposed quarantine must represent a necessary or desirable measure for which no other substitute involving less interference with normal activities is available; (3) the objective of the quarantine, either for preventing introduction or for eliminating spread, must be reasonable of expectation; (4) the economic gains expected must outweigh the cost of administration and the interference with normal activities.

In the matter of modification and repeal of quarantine regulations, the principles of plant quarantine adopted by the National Plant Board are as follows:

Modifications. As conditions change, or as further facts become available, a quarantine should be modified promptly, either by inclusion of restrictions necessary to its success, or by removal of requirements found not to be necessary. The obligation to modify a quarantine as conditions develop is a continuous obligation, and should have continuous attention.

Repeal. If a quarantine has attained its objective, or if the progress of events has clearly proved that the desired end is not possible of attainment by the restrictions adopted, the measure should be promptly reconsidered, either with a view to repeal or with intent of substituting other measures.

The question is frequently asked as to why there is no plant quarantine inspection of aircraft and trains.

Regarding plane inspections. all airplanes arriving in California from foreign countries are inspected for restricted plant material. However, there are several reasons why there is no inspection of airplanes from other states. All regularly scheduled flights originate and terminate in metropolitan areas not included in, or immediately adjacent to, agricultural areas. Most fruits carried by passengers are consumed before the plane or train reaches agricultural areas. In any event, there is not the degree of hazard from this source that there is from persons traveling by automobile who buy fruit en route and dispose of it along the highway. Further, the weight limitations imposed on passengers' baggage by airlines minimize the hazard of pest introduction.

To make sure the noninspection policy of airplanes is correct, periodic spot checks are made of air carriers arriving in California; however, little restricted material is found. Excellent co-operation is received from all airlines, in that they carefully avoid carrying restricted material in their commissaries, and arrange for any fruits or plant material left on planes by passengers to be burned or ground.

Train Inspection Test

Regarding train inspection, many years ago, for a period of two years, all passenger trains entering California were inspected. During that period, an average of one lot of restricted material was found in each five trains inspected. About 95 percent of this restricted material consisted of one or two fruits carried by passengers. Normally these fruits would be consumed in a short time.

The inspection of passenger trains, involving considerable cost for personnel, was discontinued because the extent of restricted material intercepted did not indicate a pest introduction hazard justifying its continuation.

Contributing to the support of the policy against train inspection is the co-operative arrangement under which the railroads operating passenger trains into California do not offer for sale to passengers on the trains, or carry in their commissaries, material which is restricted by plant quarantine regulations. As with airplanes. all fruits or plant materials left on trains by passengers are collected by the clean-up crews and destroyed.

The bureau is a General Fund function supported by tax money appropriated by the Legislature. The annual cost of operation is approximately $1,000,000.

Is Program Worth Expense?

Does California's plant quarantine program cost more than it is worth?

Probably no one can give a documented answer to this question, but certain conclusions can be drawn from facts definitely bearing on the subject. The U. S. Department of Agriculture has published estimates of damage by various pests based on carefully gathered data. One of these, the cotton boll weevil, the historic enemy of Southern cotton growers, has received more notice than most of the others, and therefore, more data has been accumulated concerning it.

California is one of the few major cotton producing states in the United States in which the cotton boll weevil does not occur, and serves as a good example upon which some conception of potential loss may be based. In 1957, California harvested 716,000 acres of cotton valued at $271,556,000. Cottonseed production was valued at an additional $32,147,000.

The 10-year average loss due to boll weevil in the southern producing states is estimated by the U. S. Department of Agriculture as 10.4 percent. By applying this percentage of loss to the average price received for cotton at current prices, the potential loss to California from the introduction of the boll weevil would be over $30,000,000 per year. Add to this potential loss due to the boll weevil the potential annual loss from such other of the quarantined pests as the pink bollworm, Japanese beetle, Mexican fruit fly, Mediterranean fruit fly, sweet potato weevil, European corn borer, and some of the more serious plant diseases, and the total potential annual loss would amount to many more millions of dollars.

CALIFORNIA EXTERIOR QUARANTINES

(In effect December 3, 1958)

Following is a list of quarantines against plant pests that occur in other areas of the United States and some of the important crops being protected:

Citrus Pests Exterior Quarantine, protects citrus from fruit flies, citrus canker, and other injurious insect or plant disease pests of citrus. Quarantines all states, districts and territories except Arizona.

Chestnut Bark Disease Exterior Quarantine, protects chestnut and chinquapin trees. Quarantines all states east of and including Montana, Wyoming, Colorado, and New Mexico.

Eastern Filbert Blight Exterior Quarantine, protects filbert and hazelnut trees. Quarantines all states east of and including Montana, Wyoming, Colorado, and New Mexico.

Cotton Pests Exterior Quarantine, protects cotton from cotton boll weevil and pink bollworm. Quarantines all states, districts and territories.

Cherry Fruit Fly Exterior Quarantine, protects cherry fruits from two species of cherry fruit flies. Quarantines entire states of Oregon and Washington and portions of Idaho and Montana.

Sweet Potato Weevil Exterior Quarantine, protects sweet potatoes. Quarantines portions of Alabama, Florida, Georgia, Louisiana, Mississippi, South Carolina, and Texas.

Peach Tree Diseases Exterior Quarantine, protects peach, nectarine, apricot, almond, plum and prune trees from three diseases known as peach yellows, peach rosette, and little peach. Quarantines Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Kentucky, Maryland, Massachusetts, Michigan, Mississippi, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Tennessee, Virginia, West Virginia, and the District of Columbia.

Citrus White Fly Exterior Quarantine, protects citrus and many ornamental plants from two species of white flies. Quarantines all states, districts, and territories except Arizona.

Nut Tree Pests Exterior Quarantine, protects hickory, pecans and walnuts from insect pests known as case bearers, also protects walnut from brooming disease or bunch disease. Quarantines all states and districts because of brooming disease of walnut and quarantines all districts and states east of and including Montana, Wyoming, Colorado, Oklahoma, and Texas because of case bearers.

Ozonium Root Rot Exterior Quarantine, protects over 274 cultivated and 244 noncultivated species of plants including cotton, alfalfa, clover, peas, beans, peanuts, sweet potatoes, turnips, carrots, beets, tomatoes, apple, almond, apricot, peach, pear, plum, persimmon. Quarantines entire states of Arizona, Oklahoma, and Texas and portions of Arkansas, Louisiana, Nevada, New Mexico and Utah.

Peach Mosaic Disease Exterior Quarantine, protects peach, nectarine, apricot, almond, plum, and prune trees. Quarantines entire states of Arizona and New Mexico and portions of Arkansas, Colorado, Oklahoma, Texas, and Utah.

European Corn Borer Exterior Quarantine, protects over 250 plants including corn, broomcorn, sorghums, Sudan grass, beans, beets, celery, peppers, endives, Swiss chard, rhubarb, and such ornamentals as aster, chrysanthemum, calendula, cosmos, hollyhock, marigold, zinnia, dahlia, and gladiolus. Quarantines all states and districts except Arizona, Idaho, Nevada, New Mexico, Oregon, Utah and Washington.

Colorado Potato Beetle Exterior Quarantine, protects potatoes, tomatoes, peppers, and egg plant. Quarantines all states, districts, and territories except the State of Nevada and the Territory of Hawaii.

Persimmon Pest Exterior Quarantine, protects persimmon trees against persimmon root borer and a plant disease known as persimmon wilt. Quarantines all states, districts and territories.

Plum Curculio and Apple-Blueberry Maggot Exterior Quarantine, protects fresh fruits of apple, apricot, blueberry, cherry, hawthorn, huckleberry, nectarine, peach, pear, plum, prune, and quince. Quarantines all states and districts east of the states of Montana, Wyoming, Colorado, and New Mexico, and the eastern portions of the last four states named.

Elm Tree Diseases Exterior Quarantine, protects elm trees from two diseases known as Dutch elm disease and phloem necrosis virus. Quarantines all states and districts.

Peach Wart Disease Exterior Quarantine, protects peach trees. Quarantines the entire states of Idaho, Oregon, and Washington.

Oak Wilt Disease Exterior Quarantine, protects oaks, chestnut, and chinquapin trees. Quarantines all states and districts.

Pickleworm and Melonworm Exterior Quarantine, protects cucumber, muskmelon, cantaloupe, squash and pumpkin. Quarantines all states and districts.

Burrowing Nematode Exterior Quarantine, protects citrus and avocado trees from the disease, spreading decline caused by the burrowing nematode. Quarantines the entire State of Florida, the Territory of Hawaii, and the Commonwealth of Puerto Rico.

Cornstalk Borers and Sugarcane Borer Exterior Quarantine, protects corn, and sorghums from three serious insect pests known as Southern cornstalk borer, Southwestern corn borer, and Sugarcane borer. Quarantines Alabama, Arizona, Arkansas, Delaware, Florida, Georgia, Indiana, Iowa, Kansas, Louisiana, Maryland, Mississippi, Missouri, Nebraska, New Jersey, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia.

Walnut Pests Exterior Quarantine, protects walnuts, hickory nuts, and pecan nuts against three species of walnut husk flies, the hickory shuck worm, pecan nut casebearer, the butternut curculio, and the black walnut curculio.

STATE INTERIOR QUARANTINE REGULATIONS

(In effect December 3, 1958)

Following is a list of quarantines against plant pests that occur in certain limited areas of California and some of the important crops being protected.

Peach Mosaic Disease Interior Quarantine, protects almond, apricot, nectarine, peach, plum, and prune trees. Quarantines all of San Diego County and portions of the counties of Los Angeles, Riverside, and San Bernardino.

Ozonium Root Rot Interior Quarantine, protects cotton, alfalfa, clover, peas, beans, peanuts, sweet potatoes, turnips, carrots, beets, tomatoes, almond, apple, apricot, peach, pear, plum, persimmon, fig, grape, raspberry, blackberry, ash, elm, maple, pine, and many other ornamental plants. Quarantines portions of Riverside, Imperial and San Diego Counties.

White-Pine Blister Rust Interior Quarantine, protects white-pine, sugar pine, and all other five needle pine trees. Quarantines the portion of the state lying north of the northern boundary lines of the counties of Contra Costa, Mariposa, Mono, San Francisco, San Joaquin, and Stanislaus.

Snail Interior Quarantine, protects garden vegetables and many other low plants. Quarantines a portion of San Diego County.

Quick Decline Interior Quarantine, protects citrus. Quarantines entire counties of Orange and Ventura and portions of Los Angeles, Riverside, San Bernardino, San Diego and Santa Barbara Counties.

Yellow Bud Mosaic Disease Interior Quarantine, protects almond, apricot, nectarine, peach, plum and prune trees. Quarantines portion of Butte, El Dorado, Napa, Nevada, Placer, San Bernardino, Solano, Sutter, Tehama, Yolo, and Yuba Counties.

Chestnut Bark Disease Interior Quarantine, protects chestnut trees. Quarantines a portion of San Joaquin County.

Grape Leaf Skeletonizer Interior Quarantine, protects grape vines. Quarantines a portion of San Diego and Riverside Counties.

Citrus White Fly Interior Quarantine, protects citrus, persimmon, and many ornamental plants. Quarantines a portion of the City of Sacramento.

Club Root Disease Interior Quarantine, protects broccoli, Brussels sprouts, cabbage and cauliflower plants. Quarantines a portion of San Mateo County.

Cherry Fruit Fly Interior Quarantine, protects cherry fruits. Quarantines a portion of Siskiyou County.

Yellow Leaf Roll of Peach Interior Quarantine, protects peach and nectarine trees. Quarantines portions of Butte, Placer, Sutter, and Yuba Counties.

Mexican Fruit Fly Interior Quarantine, protects citrus fruits, apples, apricots, peaches, pears, plums, and pomegranates, quinces and several tropical fruits. Quarantines a portion of San Diego County.

Khapra Beetle Interior Quarantine, protects stored grain, mill feed, cereals, and other stored animal and vegetable products. Quarantines properties on which live khapra beetles are found.

Walnut Husk Fly Interior Quarantine, protects walnuts. Quarantines the entire Counties of Imperial, Kern, Los Angeles, Orange, Riverside, San Diego and Ventura, and portions of the Counties of Merced, Napa, San Bernardino, San Joaquin, Santa Barbara, Santa Clara, Sonoma, and Stanislaus.

Cooper's Broomrape Interior Quarantine, protects tomato plants. Quarantines portions of Riverside and Imperial Counties.

Dissemination of Weed Pests Through the Movement of Feed Grain, protects agricultural lands from dissemination of weed pests through the movement and utilization of feed grain. Establishes standard of cleanliness for feed grain and provides for issuance of certificates of cleanliness for grain free from the weed pests named.

FEDERAL DOMESTIC QUARANTINE REGULATIONS

(In effect December 3, 1958)

Following is a list of quarantines of the U. S. Department of Agriculture against plant pests that occur in limited areas of the United States or in Hawaii, Puerto Rico, or the Virgin Islands and some of the important crops being protected.

Hawaiian Fruits and Vegetables, protects most fruits and vegetables from the Mediterranean Fruit Fly, the Melon Fly, the Oriental Fruit Fly, Citrus Canker, Green coffee scale, the bean pod borer, the bean butterfly, the Asiatic rice borer, the mango weevil, and the Chinese rose beetle. Quarantines the Territory of Hawaii.

Sugarcane, protects sugarcane from the sugarcane root borer and the gummosis disease. Quarantines Hawaii, Puerto Rico, and the Virgin Islands.

Sweet Potatoes, protects sweet potatoes from sweet potato scarabee and the sweet potato stem borer. Quarantines Hawaii, Puerto Rico, and the Virgin Islands.

Black Stem Rust, protects small grains. Quarantines the entire United States.

Gypsy Moth and Brown-Tail Moth, protects forest and shade trees. Quarantines the States of Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island and Vermont.

Territorial Cotton, Cottonseed, and Cottonseed Products, protects cotton from pink bollworm of cotton, the cotton blister mite. Quarantines Hawaii, Puerto Rico and the Virgin Islands.

Japanese Beetle, protects many fruits and vegetable crops, lawns, etc. Quarantines the States of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, Vermont, Virginia, West Virginia, and the District of Columbia.

Pink Bollworm, protects cotton. Quarantines the States of Arizona, Arkansas, Louisiana, New Mexico, Oklahoma, and Texas.

Fruits and Vegetables From Puerto Rico or Virgin Islands, protects many fruits and vegetables from two species of fruit flies and the bean pod borer. Quarantines Puerto Rico and the Virgin Islands.

Sand, Soil, or Earth, with Plants From Territories and Districts, protects agricultural lands and wood structures from white grubs and termites. Quarantines Hawaii, Puerto Rico and the Virgin Islands.

White Pine Blister Rust, protects white pine, sugar pine, and all other five-leaved pines. Quarantines all states and the District of Columbia.

Mexican Fruit Fly, protects peaches, guavas, apples, pears, plums, quinces, apricots, citrus fruits and several tropical fruits. Quarantines the State of Texas.

White-Fringed Beetle, protects field, garden, and truck crops, ornamental flowers and shrubs, trees and vines, including alfalfa, cotton, dahlia, lima bean, peanuts, soybeans, and strawberries. Adults have been observed to feed on more than 170 species of plants. Larvae have been observed to feed upon 240 species of plants. Larvae also feed on carrot, corn, cotton, oat, peanut, strawberry, sweet potato, and Irish potato. Quarantines Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee.

Khapra Beetle, protects stored grain and many other stored vegetable and animal products. Quarantines properties on which live khapra beetle have been found in the States of Arizona, California, and New Mexico.

European Chafer, protects pastures, lawn, small grains, grasses, clover, and other legumes. Quarantines the States of Connecticut, New York and West Virginia.

Mediterranean Fruit Fly, protects many fruits and vegetables. This regulation quarantined the State of Florida. Although the regulation has not been revoked, it appears that eradication of Mediterranean fruit fly in Florida has been successful.

Soybean Cyst Nematode, protects soybeans, vetch and other legumes. Quarantines the States of Arkansas, Kentucky, Mississippi, Missouri, North Carolina, and Tennessee.

Witchweed, protects corn, sorghum, and other crops of the grass family. Quarantines the States of North Carolina and South Carolina.

Imported Fire Ant, protects cultivated crops such as potatoes, peanuts, cabbage, egg plant and okra, germinating seeds such as corn seed, grass and other plants of pasture land. Quarantines the States of Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, South Carolina, and Texas.

FEDERAL FOREIGN QUARANTINE REGULATIONS

(In effect December 3, 1958)

Following is a list of quarantines of the U. S. Department of Agriculture against plant pests that occur in foreign countries, and some of the important crops being protected.

Foreign Cotton and Covers, protects cotton, wheat and potatoes and many other agricultural crops from pink bollworm, golden nematode, the flag smut disease, and other injurious plant diseases and insect pests. Quarantines all foreign countries and localities.

Avocado Seed, protects avocados. Quarantines Mexico and the countries of Central America.

Sugarcane, protects sugarcane. Quarantines all foreign countries and localities.

Citrus Canker and Other Citrus Diseases, protects citrus. Quarantines Europe, Asia, Africa, South America, Central America, North America outside of the United States, Australia, and foreign oceanic countries and islands.

Corn Diseases, protects corn and closely related plants from several serious diseases. Quarantines Southeastern Asia (including India, Siam, Indo-China, and China), Malayan Archipelago, Australia, New Zealand, Oceania, Philippine Islands, Formosa, Japan, and adjacent islands.

Citrus Fruit, protects citrus from three diseases known as citrus canker, sweet orange scab, Can-

crosis B. Quarantines eastern and southeastern Asia (including India, Burma, Ceylon, Siam, Indo-China, and China), the Malayan Archipelago, the Philippine Islands, Oceania (except Australia and Tasmania), Japan (including Formosa and other islands adjacent to Japan), Mauritius, and Seychelles, because of citrus canker; quarantines Argentina, Brazil, Paraguay, and Uruguay because of sweet orange scab; and quarantines Argentina, Paraguay, and Uruguay because of Cancrosis B.

Sweet Potatoes and Yams, protects sweet potatoes from several injurious insects. Quarantines Cuba, Haiti, Jamaica, British Guiana, India, China, Cochin, China, Friendly Islands, Sumatra, Formosa, Philippine Islands, Australia, Madagascar, and Liberia, because of sweet potato weevils, and quarantines Barbados, Antigua, Nevis, St. Vincent, St. Kitts, Jamaica, Brazil, New Zealand, and Guam, because of sweet potato scarabee.

Bamboo, protects bamboo from dangerous plant diseases including bamboo smut. Quarantines Japan, China, India, Philippine Islands, Australia, New Zealand, Oceania, Africa, Europe, South America, British West Indies, Cuba, and Central America.

Nursery Stock, Plants, and Seeds, protects all plants from the introduction of plant pests through the entry of plants and plant parts for propagation from all foreign countries and localities.

Indian Corn or Maize, Broomcorn, and Related Plants, protects corn, sorghums, broomcorn, Sudan grass, and sugarcane from the European corn borer and other dangerous insects as well as plant diseases. Quarantines Europe, Asia, Africa, Dominion of Canada, Mexico, Central and South America, and other foreign countries and localities.

Rice, protects rice from Downy mildew, leaf smut, blight, and glume blotch. Quarantines Europe, Asia, Africa, Central America, South America, and other foreign countries and localities.

Fruits and Vegetables, protects all fruits and vegetables from the introduction of many serious fruit and vegetable pests including fruit and melon flies. Quarantines all foreign countries and localities.

Flag Smut, protects wheat. Quarantines Aden Protectorate, Afghanistan, Australia, Bulgaria, Caucasus (including but not limited to Azerbaidzhan, South Russia and Transcaucasia), Chile, China, Cyprus, Egypt. Greece, India, Iran, Iraq, Israel, Italy, Japan, The Netherlands, Oman, Pakistan, Palestine, Portugal, Saudi Arabia, Sinai Peninsula, Spain, Svria, TransJordan, Tunisia, Turkestan, Turkey, Union of South Africa, and Yemen.

Packing Materials, protects all plants from the entry of dangerous plant pests through the use of plant materials as packing. Quarantines rice straw, hulls, and chaff, cotton and cotton products, sugarcane and parts of sugarcane plants, bamboo and bamboo shoots, leaves of plants, forest litter, soil containing vegetable matter, grasses and hay from all foreign countries. Quarantines cereal straw hulls and chaff from countries named in the flag smut quarantine, quarantines corn and allied plants from countries named in the corn diseases quarantine and quarantines willow twigs from Europe.

Dutch Elm Disease, protects elms. Quarantines the Continent of Europe and the Dominion of Canada and other foreign areas north of the United States, including Newfoundland, Labrador, St. Pierre, Miquelon and islands adjacent thereto. Forbids entry of elm plants and parts thereof.

Cut Flowers, protects many agricultural crops from the enry of serious plant pests through the importation of cut flowers from foerign countries. Quarantines Europe, Asia, Africa, Australia, South America, Central America, North America, and other foreign countries and islands (other than cut flowers produced in the Dominion of Canada, Labrador, Newfoundland, and the United States).

Mexican Border Regulations, requires inspection of vehicles, railway cars, boats, airplanes, and other conveyances, freight, baggage, containers and articles or materials which may be contaminated with pests. Stations along the international border are manned by federal inspectors. Airplanes are inspected by California State Plant Quarantine officers, collaborators of the U. S. Department of Agriculture, at approved airports of entry in California.

Foreign Potatoes, protects potatoes from the introduction of potato wart and other pests from all foreign countries and localities.

Importation of Adult Honeybees Into the United States, protects honeybees from the entry of serious diseases of honeybees including queen bees, worker bees, and drones or male bees. Restricts the entry of all adult honeybees from all foreign localities except the Dominion of Canada.

Federal Plant Pest Regulations, regulate entry into the United States and movements between states of insects, mites, nematodes, slugs, snails, protozoa, or other invertebrate animals, bacteria, fungi, other parisitic plants or reproductive parts thereof, viruses, or any organisms similar to or allied with any of the foregoing, or any infectious substances which can directly or indirectly injure or cause disease or damage in any plants or parts thereof, or any processed, manufactured or other products of plants. Also regulate the entry into the Country and interstate movement of soil, stone, and quarry products, and garbage on or from any means of conveyance arriving in the United States from any foreign country or locality.

LEADERS IN CALIFORNIA PLANT QUARANTINE DEVELOPMENT

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Myoporum, an Ornamental Shrub, as a Cause of Livestock Loss

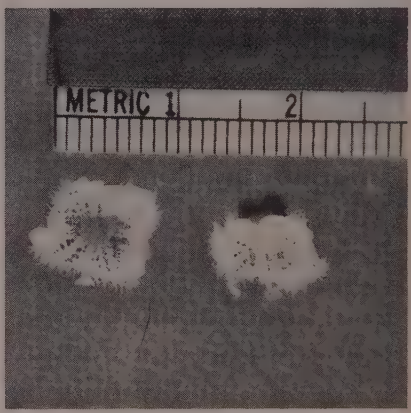
T. C. Fuller, Botanist, Bureau of Rodent and Weed Control and Seed Inspection
California Department of Agriculture

In the latter part of July 1958, in a dairy feed lot in Cypress, Orange County, one cow died and 10 or 12 showed distress with depression type of symptoms. The herd consisted of about 145 head of dry cows in excellent condition enclosed in a typical dry feed lot. At each post on the outside of the fence there was planted a shrub of *Myoporum laetum*. These shrubs were well cared for, 5 to 6 feet high, growing vigorously and bearing a heavy crop of fruit. The cows were being fed an excellent grade of leafy hay, when the feed was changed to a less leafy but good quality hay. Almost overnight the cows browsed off as much of the shrubs as they could reach through the fence. Samples of these plants were submitted to this office by Dr. A. T. Rhighetti, D.V.M., through Dr. C. A. Delli Quadri of the Los Angeles County Livestock Department.

Myoporum laetum is native to New Zealand where it is called Ngaio. The plant is an evergreen shrub or small tree. The leaves are 1¼ to 4 inches long, rather fleshy, glossy and with characteristic translucent dots in the leaf blade. The flowers are borne in clusters of 2 to 6 in the leaf axils. The floral tube is about ½ inch across, white with purple spots, with long hairs inside the tube. The fruit is a reddish-purple oblong berry about ½ inch long. The actual toxic principle is unknown, but it is known to be present in the oil of the plant. In 1890, the oil of the bark of this plant was shown experimentally to be poisonous to frogs. Experimentally, doses of 7.5 gm. of dried leaves per kgm. of body weight proved fatal to sheep in 18 hours.

Myoporum acuminatum, which is also used as an ornamental shrub in California, contains an oil of similar toxic properties. It is interesting to note that in Australia another species, *Myoporum deserti*, is considered to be the most toxic in the fruiting stage. In this case of livestock poisoning, the plants of *Myoporum laetum* were bearing a heavy crop of fruit. Small amounts of the shrub had previously been eaten by the cattle, producing no symptoms.

Branch of *Myoporum laetum* showing leaves and fruits.



Flowers of Myoporum laetum, showing the hairs within the floral tube, characteristic of several species of Myoporum.

Eriophyid Studies XXVI

H. H. KEIFER, Systematic Entomologist
California Department of Agriculture

Bitterbrush is an important browse shrub of the semidesert regions east of the higher mountains in both Oregon and California. In 1957 G. F. Kraft, of the Oregon Agricultural College, surveyed this shrub for pests and has submitted 10 collections of mite-infested twigs and leaves from a wide area in Oregon east of the Cascade Range. These mite infestations are found by examining the plants for leaf and stem galls. These galls are usually less than a sixteenth of an inch in size but when numerous enough they produce twig and leaf deformities.

Kraft found three types of galls: 1. a twig gall; 2. a leaf gall; 3. a white wooly bud gall. From the material which the writer received for examination there is the conclusion that these galls occur independently of each other. The most widespread is the twig gall which is found throughout central and eastern Oregon. The leaf gall was in collections from central Oregon, south to Lassen County, California. One Pringle Falls collection in central Oregon had both kinds from the same shrub, and in this case the leaf galls were scarce. The leaf galls seem to become more numerous to the south, and the Lassen County collection, made by H. K. Wagnon, of the California Department of Agriculture, is the only one showing severe leaf deformity.

The mites causing these leaf and stem galls are very similar and while the stem form seems to average a little larger, especially in the length of some setae, not enough evidence was found to justify making two species out of the complex.

The wooly bud gall, which deforms and prevents the growth of parts of the buds on side spurs, was found by Kraft only in Morrow County, northern Oregon. This bud gall mite is quite distinct from the other mite, as hereinafter explained.

I am naming the stem and leaf gall mite for its discoverer, G. F. Kraft, who has made this extensive survey of the occurrence of these mites.

Aceria kraftella Keifer, New Species
Fig. 1A

This species has a 5-rayed featherclaw, the microtubercles are rounded and closer and finer ventrally than on the sides and above, the only definite shield marking is a short central dash at the rear margin. The male is characterized by the almost complete lack of microtubercles.

Female up to 265μ long, 60μ thick, wormlike, dull yellowish. Rostrum 16μ long, curved down. Shield 20μ long, 33μ wide, design unclear, the median line present as a short dash at the rear margin. Dorsal tubercles 18μ apart; dorsal seta 16-18μ long. Foreleg 25μ long, tibia 5μ long, with seta; tarsus 6.5μ long; claw 7μ long; featherclaw 5-rayed. Hindleg 24μ long, tibia 4μ long, tarsus 5μ long, claw 10μ long. Coxae smooth the anterior coxae broadly touching. Second pair of coxal setae well ahead of line through third pair. Abdomen with about 60 rings, completely microtuberculate, the microtubercles rounded and ahead of rear margin; ventral microtubercles smaller and closer together. Lateral abdominal seta 20μ long, on ring 7; first ventral 35-50μ long, on about ring 17; second ventral 15-18μ long, on ring 29; third ventral 30-40μ long, on ring 9 from rear. Accessory seta present, 6-7μ long. Female genitalia 19μ wide, 10μ long; coverflap smooth; seta 8μ long.

Males up to 180μ long, the microtubercles absent except for those on a few anterior and posterior rings.

Type locality: Pringle Falls Experiment Station, Deschutes County, central Oregon. Collected: July 17, 1957 by G. F. Kraft. Host: *Purshia tridentata* DC., (Rosaceae), bitterbrush. Relation to host: The mites produce small bead galls along the young twigs while they are green. When numerous these galls cause some crookedness in the growth as well as a warty condition. A similar mite population causes small yellowish bead galls on the leaves that may deform the leaves. Type slide, so designated, of mites taken from stem galls collected at Pringle Falls. Three paratype slides also designated from this locality. There is an envelope of dry material on file.

Leaves and twigs of bitterbrush, *Purshia tridentata*, showing galls and deformation caused by Eriophyid mites. Top row with normal leaves at ends and mite galls on deformed leaves in center; these leaves from Lassen County. Twig across center showing effect of stem galls (leaves removed); specimen from Pringle Falls Experiment Station, Oregon. Lower twigs from Morrow County, Oregon, showing white bud galls. Arrows point to galls. Photo by G. M. Buxton.

Two paratype slides are also designated from each of the following localities where the mite was collected: 1. from stem galls 15 miles west southwest of Silver Lake, Lake County, Oregon, July 25, 1957, G. F. Kraft; 2. stem galls from nine miles north of Burns, Harney County, Oregon, August 7, 1957; 3. stem galls from Unity Reservoir, Baker County, August 7, 1957, G. F. K.; 4. stem galls at Kimberly, Grant County, Oregon, August 8, 1957, G. F. K.; 5. stem galls from 12 miles north of Spray, Wheeler County, Oregon, August 8, 1957, G. F. K.; 6. woody galls on side spurs seven miles east of Boardman, Morrow County, Oregon, August 8, 1957, G. F. K.; 7. leaf galls from the type locality; 8. leaf galls at Moffit Butte, Klamath County, Oregon, August 20, 1957, G. F. K.; 9. leaf galls at Johnstonville, Lassen County, California, June 18, 1958, collected by H. K. Wagnon, California Department of Agriculture.

Aceria tridentatae Keifer, New Species

This mite causes wooly bud galls on bitterbrush. The mite has five-rayed featherclaws, as *kraftella*, but unlike it the genital coverflap is furrowed, and the males have normal microtuberculation. The shield also lacks the strong short mark at the rear margin but the design seems slightly clearer.

Female 160-170μ long, 35-40μ thick, wormlike, yellowish. Rostrum 17μ long, curving down. Shield 16μ long, 27μ wide; design faint: median line present on rear third; admedians close anteriorly, diverging to rear on each side of median; lateral granulations extending forward from first rings past rear coxae. Dorsal tubercles 20μ apart; dorsal setae 15μ long. Foreleg 24μ long, tibia 4.5μ long, with seta; tarsus 7μ long; claw 5μ long; featherclaw 5-rayed. Hindleg 21μ long, tibia 3μ long, tarsus 5μ long, claw 7μ long. Coxae somewhat granular; second pair of coxal setae well ahead of line through third pair. Abdomen completely microtuberculate, the tubercles rounded and ahead of rear ring margin; microtubercles finer and closer ventrally; abdomen with 60-65 rings. Lateral abdominal seta 28μ long, on ring 8; first ventral 26μ long, on ring 18; second ventral 15μ long, on ring 32; third ventral 23μ long, on ring 7 from rear. Accessory seta present, 4.5μ long. Female genitalia 16μ wide, 9μ long, coverflap with 10-12 furrows seta 6μ long.

Males 150-170μ long, completely microtuberculate.

Type locality: seven miles east of Boardman, Morrow County, north central Oregon. Collected: August 8, 1957, by G. F. Kraft. Host: *Purshia tridentata* DC. (Rosaceae), bitterbrush. Relation to host: the mites form wooly or whitish outgrowths around the buds, especially buds on lateral spurs. This is apparently followed by a stunting of the growth. Type slide, so designated, and also six paratype slides. There is also an envelope on file with the dry material from which these slides were made.

Aceria breakeyi Keifer, New Species

This mite has been found at two widely separated places on the West Coast, on two different species of gooseberry. It is remarkable in belonging to a group heretofore believed to be confined to trees of the oak and walnut families. (A similar mite occurs on *Nyssa* in the eastern United States.) This mite by having spur-like genital tubercles is allied to the walnut erineum mite, *erineus*, and to a mite forming catkin galls on southern California black walnut, *neobeevori*. These three are compared as follows: *erineus*—dull yellow color, microtubercles rounded, set ahead of rear ring margin; *neobeevori*—dull yellow color, microtubercles pointed; *breakeyi*—red, microtubercles rounded and on rear ring margin.

Female 200-240μ long, 40-50μ thick, wormlike, red. Rostrum 22μ long, curved down. Shield 28μ long, 36μ wide, without design except rear ends of submedian lines present near dorsal tubercles. Dorsal tubercles on rear shield margin, 19μ apart; dorsal setae 24μ long. Foreleg 30μ long,

tibia 3.5μ long, with small seta; tarsus 9μ long; claw, 8μ long, slender; featherclaw 3-rayed. Hindleg 28μ long, tibia 3.5μ long, tarsus 8μ long, claw 8μ long. Coxae relatively smooth, anterior coxae broadly touching; second pair of coxal tubercles well ahead of transverse line through third pair of tubercles. Abdomen with 65-70 rings, entirely microtuberculate except dorsal rear; microtubercles rounded, touching rear ring margin. Lateral seta 14μ long on ring 5; first ventral 16μ long, on ring 20; second ventral seta 14μ long, on ring 36; third ventral 22μ long, on ring 6 from rear. Accessory seta present. Female genitalia 20μ wide, 11μ long, anterior section present in front of coverflap; coverflap smooth; seta 4μ long, on spur-like tubercles.

Type locality: Forest City, Nevada County, California. Collected: September 3, 1956, by H. K. Wagnon, State Bureau of Plant Pathology. Host: *Ribes roezlii* Regal (Saxifragaceae), gooseberry. Relation to host: the mites cause a ragged white erineum on the leaves with considerable deformation. Type slide and four paratypes designated from the type locality, plus the dry material.

Dr. E. P. Breakey, for whom the species is named, has sent me this mite from gooseberry leaves, collected on Orcas Island, Washington, September, 1957. Dr. Breakey, who is entomologist for the State College of Washington, writes the host is probably *Ribes divaricatum* Douglas, the coastal black gooseberry. He reports that nearly every leaf on the infested plant was damaged.

Cecidophyes Nalepa, 1889

References:

Nalepa—Sb. Akad. Wiss. math-nat. Wien, 1889, 98:31
Keifer—Bul. Cal. Dept. Agr. 1938, 27:302 genotype set as *galii* (Karp.) Nal.

This is a short stocky mite that rolls the leaves of various species of *Galium* in Europe. This plant belongs to the madder family (Rubiaceae) and is known as bedstraw. Through the kindness of H. Roivainen of Helsinki, Finland, of whom I requested specimens, and also of Donald Macfarlane of the British Museum, who sent me infested plant parts among a collection of various Eriophyids, I have been able to study *galii*. An illustration of the species is drawn up but lack of space prevents inclusion in this article.

The conclusion, after study of this mite, is that the genus should be transferred from the subfamily Eriophyinae, where I had originally treated it, to the Phyllocoptinae. This is based mainly on the projection of the cephalothoracic shield over the rostrum which largely hides the rostrum in dorsal view, a character inconsistent with typical members of the Eriophyinae, but present on nearly all Phyllocoptine mites. The character of the body rings on *Cecidophyes* is inconclusive. Typical Phyllocoptine mites have a sharp differentiation between the tergites and sternites. On *galii* and relatives there is very little difference dorso-ventrally although the rings ventrally are usually a little more numerous, a non-Eriophyine character.

Cecidophyes galii lacks dorsal setae and coupled with this is the spreading of the coxae and appressed genitalia. The female genital coverflap is characterized by longitudinal furrows in two uneven ranks, and the genital apodeme is shortened in ventral view.

This transfer causes *Cecidophyes* to take over two California species which are very similar to the genotype, namely *arbuti* (K.) 1939, and *caliquerci* (K.) 1944. These are transferred from *Coptophylla* K. 1944. The genotype of *Coptophylla* which is *lamimani* K. is sufficiently distinct by its broad tergites to remain separate and hold the genus name.

The two species listed above and other undescribed ones, that now go into *Cecidophyes*, are rust mite types more consistent with the Phyllocoptinae than with the habit of the genotype.

This transfer of *Cecidophyes* to the Phyllocoptinae leaves a group of species in the Eriophyinae, that lack dorsal setae, without a genus name. The following name is therefore set up to fill this place.

Cecidophyopsis Keifer, new genus

Body wormlike. Rostrum small, downcurved, first visible segment longer than second. Shield broadly rounded anteriorly, not projecting over rostrum and concealing it in dorsal view; dorsal tubercles and setae missing. Legs typical of Eriophyine mites, with all usual setae. Abdomen circular in cross section; abdominal rings similar dorsoventrally, not divided into tergites and sternites; rings completely microtuberculate. Female genitalia close to coxae, the coxae separated somewhat; coxal tubercles, especially the second pair, partially surrounded by subcircular elevations; female genital coverflap with numerous uneven longitudinal furrows, partly in two ranks; apodeme shortened in ventral view.

Genotype: *vermiformis* Nalepa 1889 *Cecidophyopsis vermiformis* (Nal.)

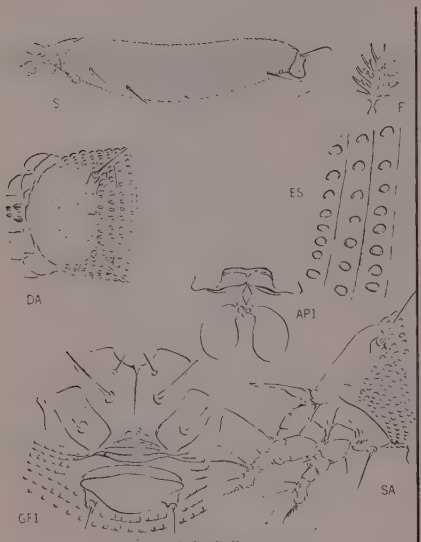


Fig 1A ***Aceria kraftella,*** new species

Fig 1B ***Vasates wagnoni,*** new species

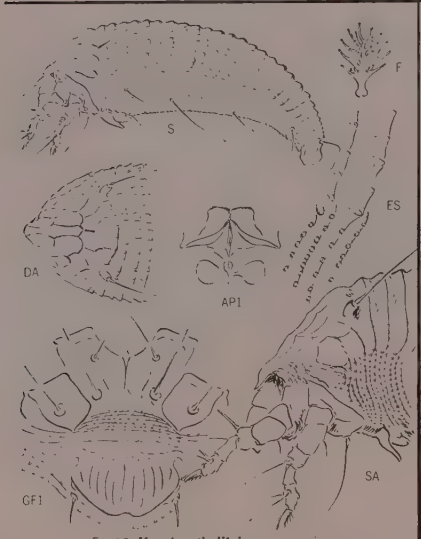


Fig. 1C - ***Vasates gleditsiae,*** new species

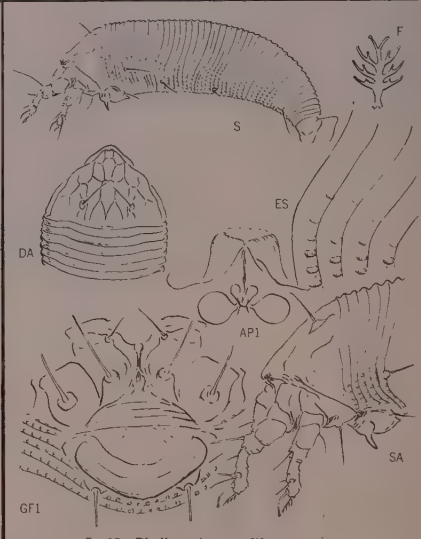


Fig. 1D - ***Phyllocoptes graniti,*** new species

References:

Nalepa—Sb. Akad. Wiss. math-nat. Wien 1889, 98:18
Keifer—Bul. Cal. Dept. Agr. 1944, 33:24

This mite is an inquilin in big-bud galls on filbert. It is widespread. My specimens came from Oregon.

Additional species in North America which will go into *Cecidophyopsis* are: *malpighianus* (C. & M.) on laurel; *psilaspis* Nal. in *Taxus* buds; *verilicis* (K.) on holly; *hendersoni* (K.) on Yucca.

European species which have not been seen that likely go into this genus are: *atrichus* Nal., *betulae* Nal., *glaber* Nal., *nudus* Nal., *psilonotus* Nal., *rubsaameni* Nal.

***Vasates wagnoni* Keifer, new species**
Fig. 1B

This mite belongs to the group of species having a pair of small spines projecting from the lower margin of the anterior shield lobe. It is comparable with *cornutus* (Banks), the peach silver mite. From *cornutus* the new species is distinguished by having the microtubercles projecting from the rear ring margins as short points. The new species also has 8 to 9 longitudinal furrows on the female coverflap, whereas *cornutus* has about 12.

Female 190-200μ long, 60μ wide, 45μ thick, spindleform, yellowish. Rostrum 20μ long, projecting down. Shield 45μ long, 55μ wide, with a narrowly rounded anterior lobe bearing a pair of small spines on anterior lower edge; design obscure, admedian apparently complete; slight lateral granulations. Dorsal tubercles 36μ apart; dorsal setae 20μ long. Foreleg 33μ long, tibia 10μ long, seta present; tarsus 7μ long, claw 7μ long; featherclaw 4-rayed. Hindleg 30μ long, tibia 7μ long, tarsus 7μ long, claw 8μ long. Coxae somewhat lined, especially forecoxae, and with granules along lines; second pair of setae slightly ahead of transverse line through third pair. Abdomen with 30-32 tergites; 60-65 sternites; microtubercles extending past rear ring edges as short points, more elongate on the tergites. Lateral abdominal seta 21μ long, on sternite 6; first ventral 40μ long, on sternite 19; second ventral 18μ long, on sternite 38; third ventral 25μ long, on sternite 5 from rear. Accessory seta present. Female genitalia 23μ wide, 15μ long, coverflap with 8-9 longitudinal furrows; seta 17μ long.

Type locality: Capell Creek, Wooden Valley, Napa County, California. Collected: June 5, 1958, by H. K. Wagnon, State Bureau of Plant Pathology. Host: *Prunus subcordata* Benth. (Rosaceae), Sierra plum. Relation to host: the mites appear on the undersides of the leaves in the spring when they are readily found, but they become scarce by early summer. No leaf damage has been noted although this is a rust mite. Type slide and seven paratype slides bear the above data. The mite is named for the collector who has brought me many Eriophyids.

***Vasates gleditsiae* Keifer, new species**
Fig. 1C

The five-rayed featherclaw, network shield design, and elongate dorsal microtubercles that project unevenly from the ring edge, characterize this species. There is more definite differentiation between the tergites and sternites than on previously described species with the above combination of characters.

Female up to 190μ long, 60μ thick, elongate-spindleform, yellowish. Rostrum 16μ long, curved down. Shield 38μ long, 48μ wide, the anterior lobe a narrow rounded point; design a network with numerous curved and cross lines which form cells; median line present as a short mark at central rear; admedian lines distinct on anterior ⅔; lateral granulations present below margin. Dorsal tubercles 37μ apart; dorsal setae 16μ long. Foreleg 25μ long, tibia 4.5μ long, with seta; tarsus 4.5μ long; claw 4μ long, knobbed; featherclaw 5-rayed. Hindleg 21μ long, tibia 4μ long, tarsus 4.5μ long, claw 4.5μ long. Coxae smooth; second pair of setae a little ahead of line through tubercles of third setae. Abdomen with about 28 tergites and 60-65 sternites; tergites with elongate microtubercles that project unevenly slightly beyond rear ring edge; microtubercles on sternites small and rounded. Lateral seta on abdomen 17μ long, on sternite 9; first ventral 54μ long, on sternite 24; second ventral seta 14μ long, on sternite 41; third ventral 18μ long, on sternite 4 from rear. Accessory seta present. Female genitalia 23μ wide, 20μ long, coverflap with about 12 furrows; seta 28μ long.

Type locality: Alexandria, Virginia. Collected: July 3, 1959, by H. V. Webster of the National Park Service, and submitted to the writer by E. W. Baker. Host: *Gleditsia triacanthos* L. (Leguminaceae), Honey locust. Relation to host: the mites are rust mites and in this case were associated with new growth on dying trees. The mite population on the submitted leaves was exceedingly heavy. Type slide and eight paratype slides designated. In addition there is the dry material from which the slides were made.

***Phyllocoptes graniti* Keifer, new species**
Fig. 1D

The four-rayed featherclaw and other characters relates this mite in a general way to *abaenus* K., (*abaenus* is on plum), but unlike *abaenus* the new species has smooth tergites and no diagonal lines on the female coverflap. The microtubercles on the new species are present on the sternites, but fade laterally.

Female 180-200μ long, 50μ thick, elongate and somewhat wormlike, light yellowish white. Rostrum 20μ long, projecting down. Shield 33μ long, 40μ wide, anteriorly with a short blunt lobe over rostrum. Shield design a network: median line absent; admedians complete, in curved sections and cross-linked, forking to rear inside dorsal tubercles; first submedian line complete, joined to adjacent lines by cross lines, ending on rear margin just inside dorsal tubercles. No lateral granules on shield. Foreleg 35μ long, tibia 7μ long, with seta; tarsus 8μ long: claw 10μ long, curved, slight knob; featherclaw 4-rayed. Hindleg 32μ long, tibia 4μ long, tarsus 8μ long, claw 10.5μ long. Coxae smooth except for curved lines toward center on anterior coxae; anterior coxae touching. Tubercles bearing second pair of coxal setae a little ahead of transverse line through third pair of coxal tubercles. Abdomen with 55-60 rings, little distinction between tergites and sternites, the former slightly more numerous; sternites microtuberculate, the tergites smooth. Lateral abdominal seta 24μ long, on sternite 7; first ventral 37μ long, on sternite 16; second ventral 9μ long, on sternite 28; third ventral seta 20μ long, on sternite 5 from rear. Accessory seta absent. Female genitalia 24μ wide, 14μ long, coverflap unfurrowed; seta 16μ long.

Type locality: Carovigno on southern Adriatic coast of Italy. Collected: August, 1958, by Dr. Antonio Graniti, Plant Pathologist, Instituto di Patologia Vegetale, Bari. Host: *Amygdalus communis* L. (Rosaceae), almond. Relation to host: the mites produce erineum patches on the undersides of the leaves. A type slide and three paratype slides are designated. There is also the dry leaf from which the slides were made. The mite is named for Dr. Graniti who submitted the leaf to me.

Tetra nielseni Keifer, new species
Fig. 2A

The possession of two-rayed featherclaws, and elm as a host, allies this species to *concava* K. From *concava* the new species is differentiated by having a blunter anterior shield lobe, and more numerous tergites. Both kinds have unusually elongate dorsal setae. The new species is American but *concava* is probably European in origin.

Female 160-170μ long, 50μ wide, 40μ thick; spindleform, with a broad dorsal concavity; yellowish. Rostrum 25μ long, projecting down. Shield 45μ long, 50μ wide, anterior lobe rough, broad and blunt. Medium line missing from shield; admedians complete, curving, diverging in broad arcs posteriorly between dorsal tubercles; submedians short, ending well ahead of dorsal tubercles; first two or three rings curving ahead of dorsal tubercles from behind the lateral shield lobes; some lateral granulations. Dorsal tubercles large, 24μ apart. Dorsal setae 100μ or more long, stout. Foreleg 31μ long, tibia 7μ long, with seta; tarsus 6.5μ long; claw 6.5μ long, knobbed, featherclaw 2-rayed. Hindleg 28μ long. tibia 6μ long, tarsus 6.5μ long, claw 6.5μ long. Coxae somewhat marked with curved lines bearing granules; second pair of coxal tubercles a little ahead of line through third pair of tubercles. Abdomen with about 55 tergites and 60-65 sternites; the sternites with small, round microtubercles on rear ring margin, microtubercles fainter on tergites. Tergites not much broader than sternites; abdomen with a broad dorsal longitudinal trough, in the central front of which is a broad rounded elevation continuing backward 8 or 10 tergites from the rear shield margin. Lateral abdominal seta 11μ long, on sternite 6; first ventral 30μ long, on sternite 20; second ventral 8.5μ long, on sternite 36; third ventral seta 15μ long, on sternite 5 from rear. Accessory seta present, small. Female genitalia 24μ wide, 15μ long, coverflap with 6 furrows, the outer ones diagonal; seta 10μ long.

Type locality: Mechanicville, New York. Collected: August 10, 1958, by Gordon R. Nielsen, Research Assistant, Cornell University. Host: *Ulmus americanus* L. (Ulmaceae), American elm. Relation to host: the mites are rust mites and cause leaf browning and drop. This damage is confused with dutch elm disease. The mites inhabit the undersides of the leaves. Type slide and four paratype slides are indicated. In addition there is the dry material from which the mites were taken. The species is named for the collector who has sent me a number of mites.

Tetra americana Keifer, new species

This mite occurs along with *nielseni* and contributes to the damage on the trees, but it differs by having a seven-rayed featherclaw and very short dorsal setae. As in *nielseni* there is a broad dorsal trough with an anterior elevated midsection, but the anterior shield lobe of the new species is much more acute in dorsal view and the shield pattern is different.

Female 160-170μ long, 40μ wide, 37μ thick; elongate spindleform, light yellowish. Rostrum 23μ long, projecting down. Shield 43μ long, 38μ wide, anterior lobe produced into a moderately acute but terminally rounded point, blunter in lateral view. Shield with median line missing; admedian lines complete, bent somewhat centrad on rear of frontal lobe, expanding and slightly recurved to center, diverging behind this and recurved to rear of shield, forked between dorsal tubercles; submedian line outside of and following admedian on posterior ⅔; shield rounded laterally, hardly lobed; some granules above coxae. Dorsal tubercles 22μ apart. Dorsal setae 14μ long. Foreleg 30μ long, tibia 6.5μ long, with seta; tarsus 6.5μ long; claw 8μ long, slender; featherclaw 7-rayed. Hindleg 27μ long, tibia 5μ long, tarsus 6.5μ long, claw 8.5μ long. Coxae with some lines of granulations; second pair of coxal tubercles slightly ahead of transverse line through third pair of tubercles. Abdomen with about 60 tergites and sternites, the sternal microtubercles fine and somewhat elongate; microtubercles fading dorsally. Dorsum with broad longitudinal trough and a central elevated broad ridge extending back 10-12 tergites from shield. Lateral seta 22μ long, on about sternite 10; first ventral 30μ long, on sternite 24; second ventral

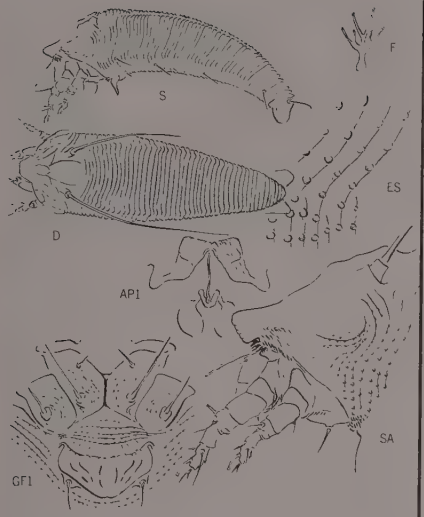


Fig. 2A - ***Tetra nielseni,*** new species

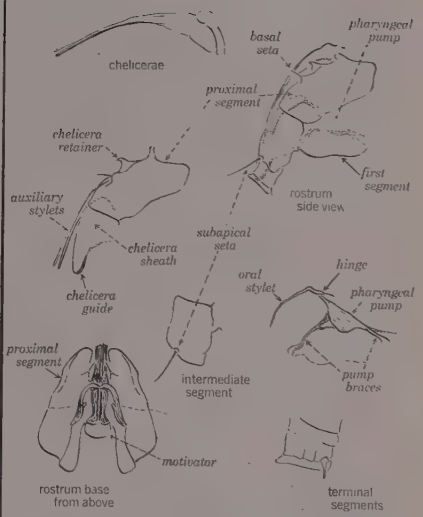


Fig. 2B - ***Aceria ligustri*** K., mouthparts

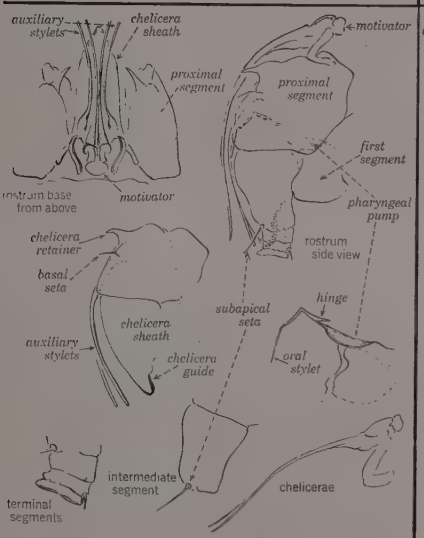


Fig. 2C - ***Calacarus carinatus*** (Greene), mouthparts

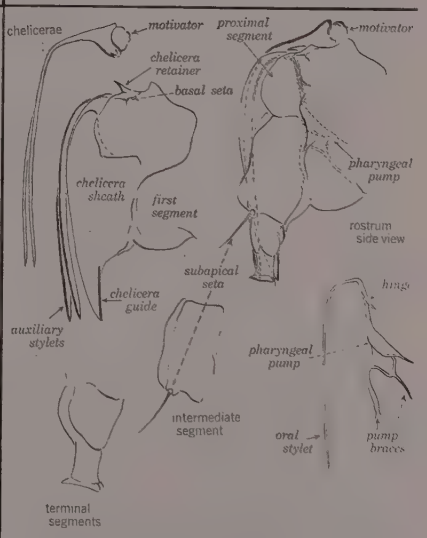


Fig. 2D - ***Diptacus gigantorhynchus*** (Nal.), mouthparts

9μ long, on sternite 37; third ventral 19μ long, on sternite 5 from rear. Accessory seta present. Female genitalia 18μ wide, 12μ long, coverflap with about 13 longitudinal furrows; seta 12μ long.

Type locality: Mechanicville, New York. Collected: August 10, 1958, by G. R. Nielsen. Host: *Ulmus americana* L. (Ulmaceae), American elm. Relation to host: the mites are undersurface rust mites causing browning of the leaves. Type slide and three paratype slides so designated. In addition there is dry material of this mite on the leaves.

* * * *

The mouthparts of Eriophyids are of importance in the classification of these mites so this installment will close with a discussion of this subject. The mouthparts of Eriophyids are in the form of a frontal beak-like structure, pointing downwards, and here collectively called the *rostrum*. While these mouthparts have their distinctive features they nevertheless stem from the fundamental organization of the Acarine gnathosome. For a general discussion of the feeding organs of mites and other Arachnids, see R. E. Snodgrass, Smithsonian Misc. Coll. 1948: 110/, No. 10, Aug.

The mouthparts of Tetranychid mites (red spiders) have been somewhat better treated than those of the Eriophyids, because they are easier to study, so some preliminary remarks on these larger mites will be helpful. The chelicerae of mites are typically a pair of separate pincher-like feeding organs, operating independently above the fused bases of the mouth palpi. In red spiders these chelicerae have become fused basally into a large protrusible lobe known as the stylophore, from the lower side of which hang the stylets. The stylets are supposed to represent the movable digits of the chelicerae.

The Tetranychid stylophore is alternately protruded and retracted during the feeding operation, the stylets running back and forth in a groove on the upper side of the rostrum. The Tetranychid rostrum is the protruded anterior part of the fused palpal bases, or palpal coxae.

These fused palpal coxae of the Tetranychids have the mouth at the anterior end of the rostrum, with the pharyngeal pump located just behind the mouth. The position of this pump is important as it locates the basal segment of the palpi both in the Tetranychids and in the Eriophyids.

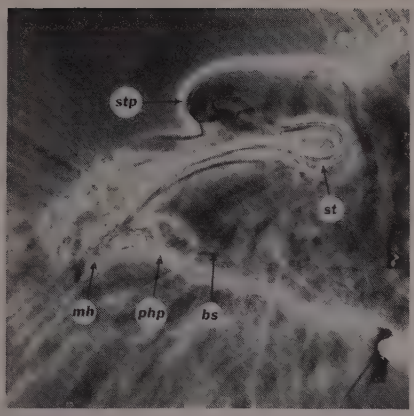
The Tetranychid palpi project anteriorly from each side of the rostrum, and consist of five segments with a claw on the fourth, or palpal tibia.

The rostrum of the Eriophyid mite (see Figures 2B, 2C, 2D, and photographs) includes the chelicerae and the palpi. It differs markedly in most respects from the mouthpart organization of the Tetranychids. The Eriophyid chelicerae are needle-like stylets, straight or curved, which originate at the upper base of the rostrum and lie in an open anterior groove on this rostrum. There is no indication of a stylophore, and these stylets cannot be projected and retracted. Their bases remain fixed and the only movement they have is a slight alternate back and forth motion produced by the action of a small knob which pivots at the chelicera bases. This knob, which moves rapidly from side to side, is here called the *motivator*. By its action it produces the boring action of the chelicerae.

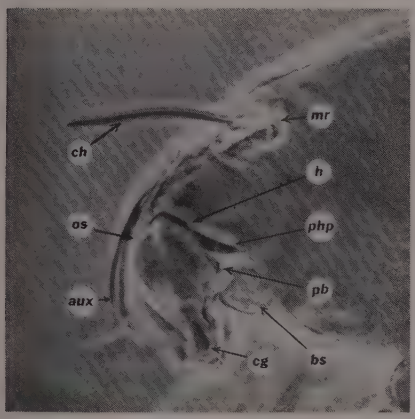
The Eriophyid chelicerae are of two fundamental forms. The usual type is that present in the smaller rostra where the cheliceral stylets are either straight, or evenly curved to the rostrum apex. Some large rostra also have this evenly curved type of chelicerae and are therefore correlated with mites possessing smaller rostra.

In the Rhyncaphytoptinae (Roivainen—Ann. Ent. Fenn. 1953:19, [No. 2], 83-87) the chelicerae usually project directly ahead from the rostrum base for a short distance and then abruptly curve down to the rostrum tip. This is the most conspicuous diagnostic feature of the mites in this subfamily, but there are additional structures that are even more useful in defining the Rhyncaphytoptinae, as will be shown.

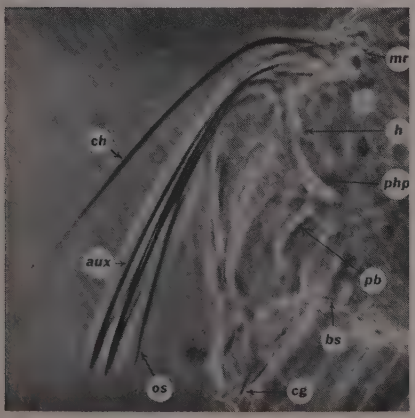
The pharyngeal pump of the Eriophyid mite is just above and ahead of the anterior coxae (see both drawings and photographs). This then indicates that the section, or lobe, lying ahead of the forecoxae is the fused first segment of the palpi. Two arms, which hold the pump front and rear are here called the *pump braces*. From the upper anterior end of the pump a curved stylet extends anteriorly upward and then recurves downward. At the base of this stylet, in front of the pump, there is a flexible joint here called the *oral hinge*. This hinge allows the *oral stylet*, which has the mouth opening at its apex, to move up and down independently.



Left side view of mouthparts of a male spider-mite, *Oligonychus stickneyi* (McG.), illustrating stylets, mouth and pharyngeal pump. Designations: bs—basal or first palpal segment, fused into rostrum; mh—mouth at apex of rostrum; php—pharyngeal pump; st—stylet; stp—stylophore. Photo by G. M. Buxton.



Left side view of the mouthparts of the camellia rust mite, *Calacarus carinatus* (Greene), with detail of the oral stylet. Designations: aux—auxiliary stylets; bs—basal or first palpal segment; cg—cheliceral guide; ch—chelicerae; h—hinge; mr—motivator; os—oral stylet; pb—pump brace; php—pharyngeal pump. G. M. Buxton photo.



Left side view of the mouthparts of the big beaked plum mite, *Diptacus gigantorhynchus* (Nal.). Designations: aux—auxiliary stylets; bs—basal or first palpal segment; cg—cheliceral guide; ch—a chelicera; h—hinge; mr—motivator; os—oral stylet; pb—pump brace; php—pharyngeal pump. G. M. Buxton photo.

In most Eriophyids the anterior bent down part of the oral stylet is hardly as long as the base of this stylet plus the pump length. In the Rhyncaphytoptinae the bent down part is considerably longer than its base plus the pump.

Projecting anteriorly and down from the inner base of the rostrum are a pair of membranes that are open along the upper anterior edge, but closed or fused to the rear. These extend to the apex of the rostrum and the palpi lie along the outside of these membranes. The cheliceral stylets lie just inside the anterior edges of these membranes, and this structure is here called the *cheliceral sheath*. At the lower apex of this sheath, just behind the points of the chelocerae, the sheath is stiffened. This stiffened end is the *cheliceral guide*. This guide is rounded apically in the rostra of most Eriophyids, but pointed in the Rhyncaphytoptinae.

Within the base of the cheliceral sheath there project a pair of stylets which resemble the true chelicerae and evidently lie alongside or just behind them during the feeding operation. In many Eriophyids these stylets are observed clinging to the chelicerae and they are here called the *auxiliary stylets*. In some positions the Rhyncaphytoptinae exhibit five stylets projecting from the rostrum. These are the two chelicerae, the two auxiliary stylets, and the oral stylet. If the chelicerae are split, which often happens, additional threads will be present.

The auxiliary stylets should be investigated for a possible connection to the salivary ducts.

The segmented portion of the oral palpi lie on each side of the above described inner structures. These palpi are flat on the inner side and the apical segments have considerable freedom of movement. Under certain circumstances these palpi move independently, and may even aid in crawling movements. These palpi have a series of segments, and while this recital will not attempt to definitely designate what each of these segments is, there is a possibility that all six segments of the Acarine pedipalp are actually present.

The first visible segment of the palpus projects from the body just below the chelicera base. This segment extends back into the body under the cephalothoracic shield, but our discussion mainly concerns the external or visible part of this segment. Since the chelicera sheath appears to originate at the base of this first external segment, and since the sheath may be part of the first palpal segment, or palpal coxae, this first external segment is very likely the second palpal segment. However, it is here called the *proximal segment*.

On the upper anterior edge of this proximal segment there are two significant structures: a spine (from each side) curving centrally over the chelicerae, and here called the *chelicera retainer*, and just below and outside it the *basal seta*. The chelicera retainer and basal seta are situated above the upper curve of the oral stylet, and just anterior to the origin of the auxiliary stylet. On Eriophyids with smaller rostra, and relatives, this retainer and seta are about midway from the body edge to the distal end of the proximal segment. In the Rhyncaphytoptinae the oral stylet curves up nearer the chelicera base than in the mites with smaller rostra, and the auxiliary stylets also originate nearer the chelicera base. This draws the retainer and basal seta closer to the body edge in the Rhyncaphytoptinae, and shortens the proximal segment.

The *intermediate segment* of the palpus originates at the distal end of the proximal segment and is characterized by the presence of a large seta at its anterior distal edge. This is the *subapical seta* of the palpus. The intermediate segment is shorter than the external part of the proximal segment on smaller rostra. On the Rhyncaphytoptine rostrum the visible, or external, part of the proximal segment is shorter than the intermediate segment.

From the lower distal end of the intermediate segment hang the terminal segments. A sensory seta, or papilla, projects from the rear side of this section just above the lips. If the terminal lips of this section are a segment, then the terminal segments are three in number and all six palpal segments are accounted for. On smaller rostra these terminal segments are relatively short and stout. The Rhyncaphytoptine terminal segments are attenuate.

When an Eriophyid projects its stylets into plant tissue it does not push these ahead or down from the normal body position. Instead, the terminal palpal segments telescope, in the case of the smaller rostra, or fold back, as in the Rhyncaphytoptinae. The cheliceral guide also apparently moves with these terminal palpal segments.

The following table summarizes and compares the preceding information:

RHYNCAPHYTOPTINAE

Rostrum large in comparison to body and apically attenuate.

Chelicerae usually projecting ahead for short distance, then abruptly bent down to rostrum apex.

Oral stylet with distal recurved portion longer than stylet base plus pump; curve of oral stylet not far below chelicera base.

Proximal segment with external part shorter than intermediate segment; basal seta and retainer drawn close to body edge.

Cheliceral guide pointed apically.

Terminal segments of palpi attenuate and folding back during feeding operation.

OTHER ERIOPHYIDS

Rostrum usually small in comparison to body, but may also be large.

Chelicerae straight or evently curved to rostrum apex.

Oral stylet with distal recurved portion usually shorter than length of stylet base plus pump; stylet recurving well below chelicera base.

Proximal segment with external part longer than intermediate segment; retainer and basal seta at about midpoint on proximal segment.

Cheliceral guide rounded apically.

Terminal palpal segments short, stout, telescoping during feeding operation.

This discussion of the mouthparts is illustrated by three figures. Figure 2B is of *Aceria ligustri* (K.), one of the species with a small rostrum. The body of this mite is about 40μ thick, the rostrum is 25μ long, the external part of the proximal segment is 12μ long, intermediate segment 8μ long, terminal segments 5μ long.

Figure 3B is of *Calacarus carinatus* (Greene), (*adornatus* K.). This is a mite with a large rostrum but is otherwise similar to *Aceria*. The body is 60μ thick, rostrum 50μ long, external part of proximal segment 28μ long, intermediate segment 14μ long, terminal segments 8μ long.

The Rhyncaphytoptinae are illustrated in Figure 4B, by *Diptacus gigantorhynchus* (Nal.). In this case the body is 70μ thick, rostrum 60μ long, external part of proximal segment 18μ long, intermediate segment 27μ long, terminal segments 15μ long.

* * * * *

Eriophyid Studies XXV appeared in this Bulletin, Vol. XLVI, No. 3, pp. 242-248, July-Aug.-Sept., (Nov. 12), 1957.

Designations on the drawings which appear as letters and figures are: AP1—internal structures in the female genitalia; D—dorsal view of mite; DA—dorsal view of shield; ES—lateral epidermal structures; F—feather-claw from below; GFI—coxae and female genitalia from below; S—lateral view of mite; SA—side view of anterior section of mite.

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[1] Quarterly Bulletin, California Department of Agriculture.

[2] Annual Report, California Department of Agriculture.

List of Motion Pictures and Kodachrome Slidefilms.

What We Do: A concise explanation of the functions and duties of the California Department of Agriculture.

Agricultural Statistics

Field Crop Reports: Grains, hay, beans, rice, flax, potatoes, sugar beets. Issued monthly except January, February and December.

Grain Stocks: Grains in all positions: Issued quarterly.

Rice Stocks: Rice in warehouses, and mills. Issued monthly.

Rice Stocks: Rice on farms: Issued January, April, August and October.

Fruit & Nut Crops: All major fruits and nuts. Issued monthly.

Fruit & Nut Acreage: Acreage by counties and varieties. Annual issue.

Vegetable Crop Notes: All major commercial vegetables. Semimonthly.

Other Vegetables Reports: Reports on processing vegetables and other vegetable crops. Issued periodically.

Cotton Reports: Issued monthly July through December.

Field Seed Crops: Alfalfa, alsike, ladino, sudan, vetch seed, etc. Issued periodically in season.

Livestock and Range Reports: Condition of livestock and pastures, inshipments of livestock, inspected slaughted. Monthly.

Livestock Slaughter Report: Number each species slaughtered. Monthly.

Cattle on Feed Report: Number of cattle on feed and related data. Quarterly.

Other Livestock Reports: Pig crop, Wool production, Bees and Honey, Lamb, shipments and inventories. Issued periodically.

Chicken Reports: Hatchery and egg production reports, issued monthly. Hatchery and broiler placement report, issued weekly.

Turkey Reports: Hatchery and pullorum testing report, issued monthly. Poults hatched and eggs set, issued weekly.

Honey Reports: Honey and Wax. Issued weekly.

Farm Commodity Prices: Major commodities, except vegetables and most fruits. Issued monthly.

Dairy Bulletin: Milk production and utilization and manufactured dairy products. Issued monthly.

Manufactured Dairy Products, Milk Production, Utilization & Prices: Issued as special publication of California Department of Agriculture. Annual publication.

Annual Summary Reports: Covers each major commodity group listed under Agricultural Statistics.

Special Releases: Pertains to one or more commodities and occasionally includes long-time statistical series. As issued.

Weather and Crop Bulletin: Report on weather and its effects on agriculture in California. Issued weekly.

Chemistry

Fertilizing Materials: Special publication, annual issue.

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Public Grain Warehouses Registered for the Year: Issued annually.

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Current Market Information: The Bureau of Market News, in co-operation with five commodity divisions of the Agricultural Marketing Service, United States Department of Agriculture, operates in California as the Federal-State Market News Service. This agency publishes approximately 140 series of daily, semiweekly, weekly, monthly, seasonal, and annual reports from 25 offices scattered throughout the State. These market reports include current information as to prices, rail and truck shipments, market receipts, storage holdings or movement, volume of sales, and other related information. Most reports also contain concise descriptive summaries of market conditions. Current or historical reports issued by the Federal-State Market News Service are mailed free upon request to trade associations, business organizations and individuals who have need of them. To receive such reports, outline your needs in a request directly to Federal-State Market News Service, 1220 N Street, Sacramento 14.

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California Meat Inspection: Annual report of bureau activities.

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[1] Issued quarterly. Free distribution by request to Office of Information, California Department of Agriculture. Many back issues still available on request.

[2] Issued as the April-May-June issue of the Quarterly Bulletin. Covers departmental activities of preceding calendar year.

The following publications are available only by purchase from the Documents Section of the State Printing Division. Requests should be made directly to the Documents Section, State Printing Division, Sacramento, California.

Agricultural Code, 1957.
Agricultural Code Extracts.
Codes and extracts are revised biennially, every odd-numbered year.
Agricultural Chemicals and Pest Control Business.
Agricultural Warehouses.
California Beef Council Law.
California Seed Law.
Canning Tomato Standards, Grapes for By-products, Fruit, Nut and Vegetable Standards, Honey Standards, Seed Potato Certification, Egg Standards, Poultry and Rabbit Meat Classes.
Commercial Feeding Stuffs.
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Grain Warehouse Inspection Law.
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Livestock Marks and Brands, Slaughterers' and Public Sales Yard Licenses, Estrays, Packers and Stockyards.
Livestock Remedies Law.
Marketing of Milk and Dairy Products.
Meat Inspection.
Poultry Meat Inspection.
Processors of Farm Products.
Produce Dealers.
Production and Processing of Milk and Dairy Products.

Weeds of California: A clothbound book by W. W. Robbins, M. K. Bellue, W. S. Ball, California Department of Agriculture, 1951—548 pp. Price, $5 plus tax and mailing. Available from Documents Section, California Printing Division, Sacramento 14.

California Cattle Brands—1954: Issued once every decade. Available from Documents Section, California Printing Division, Sacramento 14. Price: $7.73 incl. tax and mailing.

California Cattle Brands Supplement: Issued annually. Available from Documents Section, California Printing Division, Sacramento 14. Price furnished on request.

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